ELECTRICAL REVIEW

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Contents — 8th April, 1949

EDITORIAL—
Overhead Power Lines . . . 557

ARTICLES—
Factory Distribution Conversion . 559
Noise and Its Measurement. By H. G. M. Spratt, B.Sc., M.I.E.E. . 565
Fibreboard Cases 569

REPORTS—
Power System Analysis . . . 564
Atomic Energy 567
Lighting Restrictions Relaxed . . 574
South Western Industry . . . 577
Development in South West . . 579
Electrical Supervisors . . . 580
Overhead Line Regulations . . 581
Lighting Fittings 587
Scottish Minerals 587
Exports to Canada 589

REPORTS—*continued*
Transport in Glasgow . . . 590
Street Lighting Improvements . . 590
Physical Society's Exhibition . . 592

NEWS SECTIONS—
Personal and Social, 571 ; Commerce and Industry, 583 ; Electricity Supply, 591 ; Financial, 593 ; Contracts, 599.

VIEWS ON THE NEWS . . . 568
CORRESPONDENCE 576
NEXT WEEK'S EVENTS . . . 588
NEW PATENTS 597
Classified Advertisements . . . 75
Index to Advertisers 92

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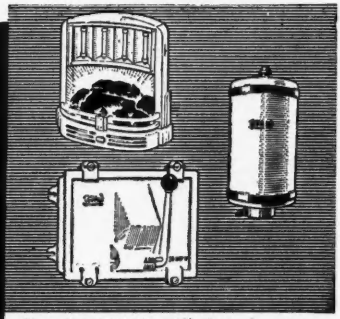

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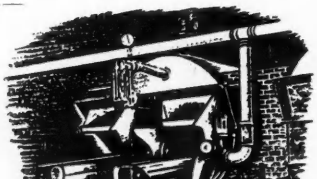

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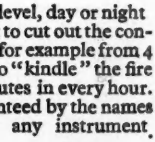

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER

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Overhead Power Lines

REGULATIONS TO BE FUNDAMENTALLY CHANGED

NEARLY a quarter of a century ago the International Electrotechnical Commission unsuccessfully endeavoured to secure some measure of agreement internationally with respect to regulations governing the design and construction of overhead power lines.

Just ten years ago an I.E.C. report was published which usefully compared the regulations then in force in different countries. Britain has never desired anything like the detailed V.D.E. code in Germany or the involved United States rules. Regulations have, however, existed since 1882.

Early Control

The few paragraphs relating to "aerial conductors" in the Electric Lighting Act of that year were the beginnings of all subsequent endeavour to regulate the erection of overhead lines. Very few were, in fact, put up in this country prior to the transfer of responsibility for such rules from the Board of Trade to the former Electricity Commissioners. They were, indeed, prohibited within the London area and frequently vetoed by local authorities elsewhere.

It was the Electricity (Supply) Act, 1919, that made it possible to obtain compulsory wayleaves, which encouraged transmission and distribution otherwise than by means of cables buried underground. Since then more than 23,000 miles of lines have been erected overhead in the British Isles and the national interlinking grid system has become a model for study in all parts of the world.

Mainly because of the need for economy of materials during the war period, the regulations then being enforced were relaxed to some extent after preliminary investigations by the E.R.A. This eventually formed the basis of BS.1320:1946, relating to conductors of up to and including 0.05 sq in cross-sectional area. In addition, six years' experience of the reduction of permissible line-sag clearance above ground has proved that it represents an important element in the cheapening of overhead lines, without impairing safety.

The success of experiments of these kinds and the reorganization of the supply industry, which has, incidentally, transferred responsibility for these regulations to the Ministry of Fuel and Power, have made a general tidying up desirable. Instead of trying to revise individually El.C.53 (1947 revise), which differ from those of 1931 only in repect of Regs. 19 (danger notices), 20 (unauthorized climbing), and 21 (an exact copy of BS. 1320), it has been considered better to recast the whole in smaller compass. This has been done by the I.E.E./B.S.I. Code of Practice Committee for Overhead Electric Power Lines, appointed in March, 1946.

Draft Proposals

The resulting proposals are explained in the paper presented to the I.E.E. last week (to which reference is made on another page) by Mr. H. W. Grimmitt, who is the chairman both of the Code of Practice Committee and of its drafting committee, with the object of eliciting criticism before completing the final draft.

When outlining the reasons for making what, at first sight, may seem to be drastic changes, he was careful to point out that no attempt has been made to compile a text-book on the subject.

The new Code is not intended to be a specification. It is confined to essentials and it defines minimum conditions, which must be applied with discretion in respect of weather, relative importance of individual power lines and particular localities. It must be remembered, too, that the proposal is to establish a Code of Practice for the Electricity Boards, so that the recommendations will not necessarily apply rigidly to lines outside the direct control of the Boards.

They appear to be rational and their engineering soundness was not seriously questioned in the discussion last week. The implications are, however, far-reaching. Such fundamental changes as have been proposed cannot, therefore, be undertaken lightly. Other countries are seeking guidance from British practice.

INCREASING PRODUCTIVITY

One prominent characteristic of modern British industry is its growing willingness to pass on information for the general good. Very few concerns try to keep their production methods secret, as most manufacturers realize that increased efficiency is a national need. They are willing to allow open inspection of their works by the technical and trade Press so that knowledge of organization and methods may be diffused. That was the outstanding impression gained during a tour of industries in the South-Western Region, briefly reported in this issue, one of a series being arranged by the Ministry of Supply.

FARMERS AND ELECTRICITY

Depressed conditions in the agricultural industry before the war, coupled with the availability of cheap labour, made the task of the rural electrical developer a hard one. Now the roles are reversed, and the pressure comes from the farmers. Some of the factors which make it difficult to meet the demand as quickly as both parties would like were explained last week by Mr. S. F. Steward, chairman of the South-Western Electricity Board; moreover he told the farmers plainly that they were not doing all they could to help. One-third of the farms in the Area which had electricity used it only for domestic purposes, and a greater proportion solely for lighting farm buildings. To supply a typical farm of 100 acres might cost £250, and the annual revenue for domestic purposes might perhaps be £22, giving a return of 9 per cent; used for dairy and other farm purposes the revenue would probably be £50, a 20 per cent return, making it an altogether different proposition. Far more than this would be saved in the wages bill, and farmers would be more certain to keep the labour they needed.

WIND POWER

The water wheels of our forefathers have given place to modern hydro-electric plants, but no similar development has occurred with windmills, although there are, it is true, a number of small wind-driven generators in existence for lighting country houses and farms. The first serious investigation in this country into the possibility of harnessing the winds is now being carried out by the Electrical Research Association, in collaboration with the B.E.A. and the North of Scotland Board. A series of high-altitude units along the western coast is visualized. One experimental tower has recently been erected 1,392ft above Dolgarrog, where wind measurements will be electrically recorded. In this issue the B.E.A., is inviting tenders for the design, manufacture and setting to work of an experimental 100 kW wind-driven generator.

"CLOW" SURCHARGE

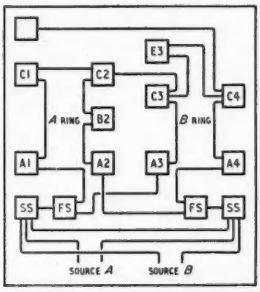
Our opinion that the Minister of Fuel and Power will not attempt to repeat the winter surcharge arrangement is strengthened by a resolution passed by the North Western Electricity Consultative Council recently. The Council mentions the numerous cases of hardship shown by an investigation conducted by the E.A.W. Preston branch and other organizations due to the operation of the differential charges. It is "strongly of the opinion that the experiment should not be repeated and that an announcement should be made to this effect without delay." We agree, for there are possibilities of grave damage to the electricity supply industry in any threat of repetition.

Factory Distribution Conversion

REARRANGEMENT OF A VERY LARGE SCHEME

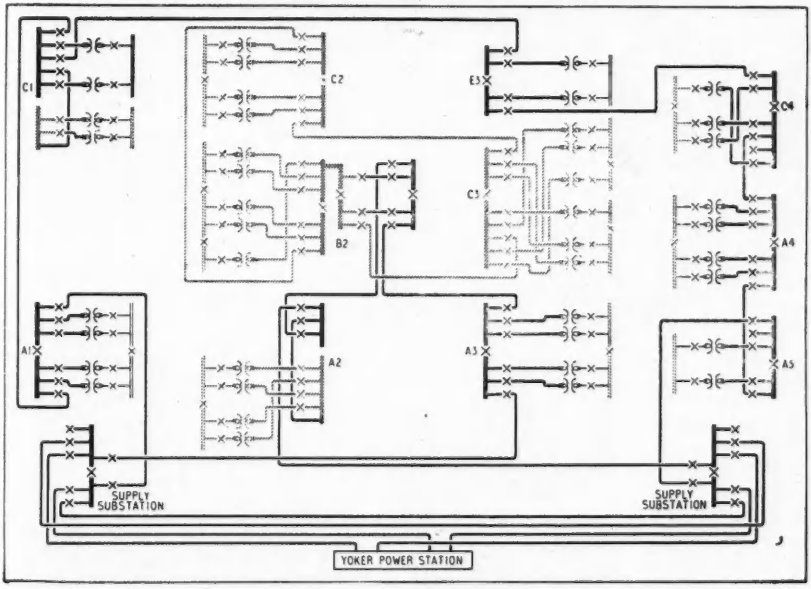
IN the *Electrical Review* of 3rd November and 10th November, 1944, the primary and secondary distribution schemes of the large wartime aero-engine factory at Hillington, Glasgow, of Rolls-Royce, Ltd., were described. The original factory consisted of sixteen very large blocks of buildings within a rectangular area of about 85 acres, the blocks being separated and bordered by wide roads running at right angles. The actual factory production floor space was about 2,000,000 sq ft.

Since 1945, to meet peacetime conditions, the whole area and its buildings have been taken over by Hillington Industrial Estates, Ltd., who have rearranged and adapted the whole area and its buildings to accommodate about a dozen tenants (consumers), of which Rolls-Royce is still by far the largest, occupying nearly half of the original area and buildings.



The object in this article is to show how the original distribution scheme for this area has been modified by the electricity supply authority (now the South-West Scotland Electricity Board) and the Technical Department of the Estates Company, in close association, particularly in the early days, with the electrical department of Rolls-Royce, to meet the needs of the several consumers.

Originally two ring mains, each with five or six substations, served one consumer throughout the whole area; now major outer and inner rings constitute the supply system for the new consumers and a secondary inner ring is the factory system for the largest consumer.



The revised arrangements provide for both high-voltage and low-voltage services, according to the consumers' local requirements. Whereas originally the supply authority's interest ended at the original respective supply substations on the site, it has now taken over considerable portions of both the high-voltage and low-voltage systems.

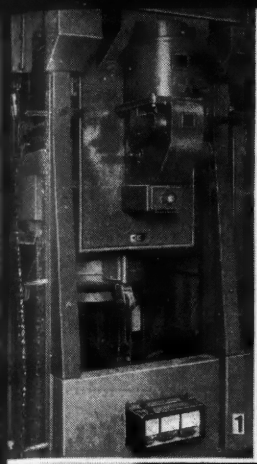
The original primary distribution scheme comprised two 11-kV ring mains, each linking five substations at load centres throughout the whole of the site. These ring mains were supplied from two main factory substations which, in turn, were supplied from the two adjacent supply authority substations. Further, these supply substations were served from two separate supply groups direct from the Yoker power station now belonging to the South West Scotland Division of the British Electricity Authority. Both group supplies were taken to each of the supply substations where they were sectionalized by normally open bus-bar couplers.

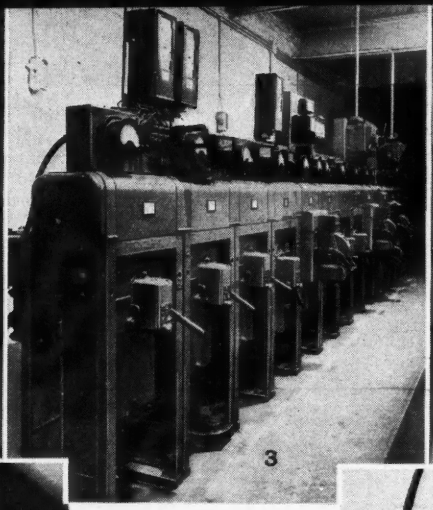
There was interconnection between the supply substations and the two ring mains "A" and "B" were so arranged that each was supplied from the appropriate supply group "A" or "B." There was also an interconnection between the two rings, i.e., from a substation on ring "A" to one on ring "B," and this interconnection was also normally open, so that, in effect, the factory

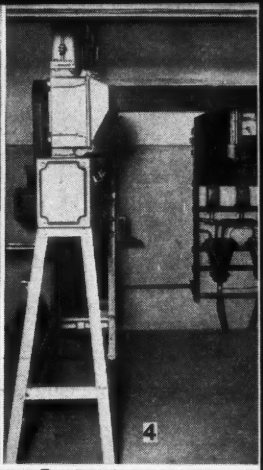
(1) Where substation switchgear has been split the supply and consumer sections have been separated by an expanded-metal partition

(2) To the original main supply substations the major outer and inner rings are now connected direct

(3 and 4) H.v and l.v switchrooms of B2 substation which is now the main Rolls-Royce feeding point







(1) From the supply section in a split substation there is a solid cable connection to the consumers' switchgear

(2) New supply switchgear for the present Rolls-Royce factory was used in one of the original substations

(3) In some cases at first temporary meters were connected to the appropriate circuit breakers which were already equipped with current transformers and metering terminal blocks

(4 and 5) For direct low-voltage consumers a standard main switchboard is used, varying in size according to the area; metering point is installed beside the switchboard

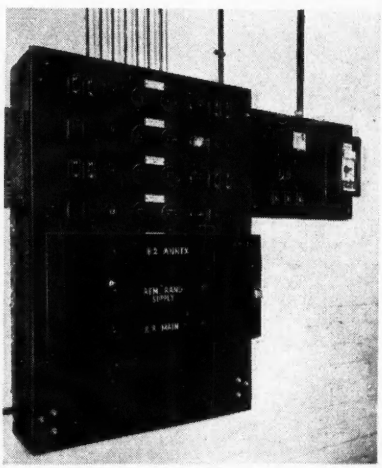
as a whole was served by four open-ended feeders.

The main incoming supply arrangements up to the supply substations still exist, including the interconnections, with the exception that the system is now fed from one supply group at Yoker power station. The two main factory substations, however, have been dismantled and utilized elsewhere as explained later, and the rings have been connected directly to the main supply substations. The two original ring mains have now been so split and reconnected as to form two major rings—one outer and one inner—over the whole site, while a secondary 11-kV ring has been arranged as a "tee" off the new major inner ring. This secondary ring constitutes, with its substations and associated equipment, the primary distribution scheme of the present contracted Rolls-Royce factory. The original interconnection between the rings has been utilized in forming this secondary Rolls-Royce ring.

The new major outer ring embraces six substations, namely, A1, C1, E3, C4, A4, and A5. The last has been installed since the system was described in 1944, but all six of these substations were embodied in the original system. Of the other five substations, A4, C4 and E3 were on

the original ring "B," while substations A1 and C1 were on ring "A." Each of the major rings now connects to the bus-bars of the main supply substations which, in turn, connect to the main supply substations; these, in turn, connect to the main feeder system from Yoker. On the major inner ring are the original substations A2 and A3, as well as an additional 11-kV switchroom to the original B2 substation which now forms the main supply point for the present Rolls-Royce factory.

This new switching station is similar in all respects to each of the original main factory substations which do not now exist as such; indeed the equipment is actually that which was in service in one of the original main factory substations. The five-unit switchboard provides two incoming ring-main connections from the two main supply substations *via* substations A2 and A3, respectively, two outgoing units to the adjacent Rolls-Royce main transforming substation and a bus-bar coupler. On the Rolls-Royce ring main there are the two original substations C2 and C3 in addition to the extended B2 substation to which we have just referred.



Where high-voltage switchgear has been split the portion of the control gear serving the supply authority's switchgear has been screened

The present-day load requirements have resulted in three distinct schemes in respect of the supply authority's control of the system: (a) where the whole of an original substation has been taken over by the supply authority to provide local low-voltage supplies to consumers; (b) where the supply authority has taken over sufficient high-voltage equipment to provide a high-voltage supply only to the particular consumer in whose premises the substation is situated; and (c) where the supply authority has taken over parts of both of the high-voltage and low-voltage equipment, so as to afford a high-voltage supply to the consumer in the immediate neighbourhood and low-voltage supplies to other consumers. In cases (b) and (c) the appropriate switchboard bus-bars have been split into two portions, with the result that there is now one section of each switchboard serving as the supply authority's substation equipment with incoming and outgoing ring-main units and a consumers' service unit. Where the actual physical split has been made the complete switchroom and its equipment have been divided by an expanded-metal partition which provides for access by the supply authority to the consumers' side of the switchroom.

This scheme for case (b) at A2 substation entailed transferring one of the ring-main feeder units and its ancillary equipment from what has become the consumers' side of the board to the supply side and making a connection from the supply section to the consumers' section by means of a solid cable connection to the bus-bars on the consumers' side. This, of course, in turn, necessitated the reconnection of the transformer feeders, and in this particular instance the bus-bar coupler unit was re-equipped as a transformer unit in order to provide facilities for four transformers to the particular consumer concerned. The entire low-voltage equipment and facilities in this case are utilized by the one consumer. An example of case (c) exists at the C1 substation where the high-voltage switchgear has been arranged in a manner similar to that cited under case (b), except that the supply authority has taken over more of the 11 kV units for transformer supplies. The consumer has been connected in a similar manner on the high-voltage side, while the low-voltage switchboard has also been split

to provide a self-contained section for the supply authority and a similar section for the consumer.

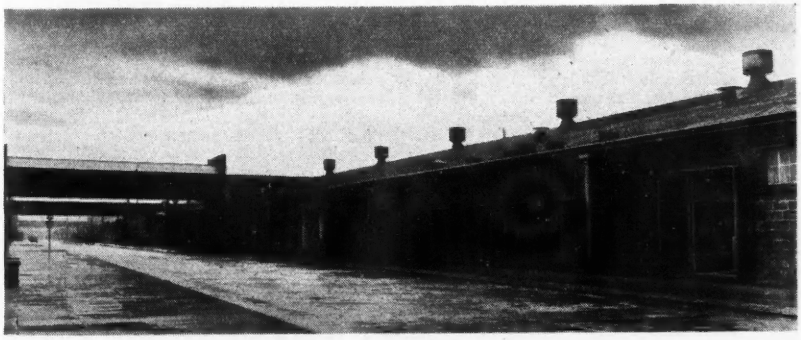
The original remote control schemes for the high-voltage switchgear in each substation, i.e., from a panel generally situated in the adjacent low-voltage switchroom, still exists, but where the high-voltage switchgear has been split the remote control panel, although left unaltered as far as the equipment proper is concerned, has that portion of it serving the supply authority switchgear screened, so that the consumer has access only to that part of the board associated with his own switchgear. This scheme also prevents unauthorized interference or inadvertent contact with the supply authority's switchgear.

In affording permanent supplies to the low-voltage consumers the supply authority took over and utilized the existing low-voltage switchgear and laid new cables from the respective substations to the consumers' premises, and in doing this the authority utilized, wherever possible, spare ducts laid for the original scheme, and where necessary new cables were laid solid.

A main switchboard has been made available in each of the consumers' premises, varying in size according to the area provided for. The general arrangement is a circuit-breaker at the bottom feeding on to central enclosed bus-bars from which are supplied low-voltage feeder units controlling the original overhead low-voltage feeders to the factory power and lighting boards.

The original metering scheme for the whole area and relating to the one consumer only of that time has been replaced by various metering schemes to suit the individual consumers' requirements. In the case of high-voltage consumers, existing equipments from the original incoming feeders in the factory substations have been utilized by the addition of metering current transformers, within the existing chambers, the original current transformers being utilized now for protection only. Until such time as the high-voltage alterations were carried out the respective consumptions were metered on the low-voltage side. Where the whole of the low-voltage switchboard was devoted to one consumer, as in block A2, the existing kWh meters on the low-voltage transformer switch-units were used, and when the supply authority took over it inserted temporarily a low-voltage meter at the same point and utilized the existing current transformers. Where direct low-voltage supplies have been afforded, the supply authority has provided its own normal metering equipment. The supply metering point for each low-voltage consumer has been installed by the side of the main switchboard or circuit breaker.

As the new consumers occupied their premises before the distribution system could be rearranged on a permanent basis, existing feeders were adapted where necessary and temporary meters were inserted. This was generally done by connecting the meters to the appropriate circuit breakers in the low-voltage switch-



Original substations with their high-voltage and low-voltage switchrooms and substation chambers remain

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boards. As the circuit breakers were already equipped with current transformers and metering terminal blocks this work was simplified. In a few cases it was necessary to insert temporary metering in the existing overhead distribution system which was left in to provide supplies to various consumers until the supply authority could lay the new permanent low-voltage cables. Before the supply authority took over the distribution scheme the metering was carried out and controlled by the Rolls-Royce electrical department in collaboration with the Estates Company.

As we have already indicated, the switchgear employed for the reconstructed scheme is generally that which was installed throughout the original distribution systems and factory installation. Some of the units still occupy their original positions and formations, while others have been transferred to new positions and incorporated in the reconstructed switchboards, service boards, etc.

All the substation high-voltage and low-voltage switchgear is of Crompton Parkinson production, the transformers are of British Electric Transformer make, and the fuse-switches which make up the low-voltage service boards throughout the consumers' premises are English Electric.

We are indebted to Hillington Industrial Estates, Ltd., for permission to re-visit the area and to publish this account of the reconstruction scheme, and to Mr. R. Clark, electrical engineer to the Estates Company, for his help in obtaining the information and illustrations.

Power System Analysis

A FIVE-DAY Vacation School is being held at the Imperial College of Science and Technology in London this week to review the methods of handling problems that arise in the planning of electrical power systems, so that those engaged in the solution of these problems may exchange views about current methods and discuss suggestions for improvements. Those attending the course include some sixty electrical engineers from the B.E.A., the electrical industry, research organizations and universities. Each morning and afternoon session is being devoted to the discussion of some aspect of the problem of calculating the flow of current and power in an electrical network. Notes on the topics for discussion have been circulated in advance, each being introduced by a short lecture leaving the greater part of the time free for discussion.

The course was opened on Monday last by Sir John Hacking (B.E.A.), who said that high-voltage transmission must play an increasingly important role in the future, and it was only by a concerted study of this kind that we should develop the most efficient system and make the most scientific use of the materials available. After outlining the present state of development and the problems encountered, Sir John emphasized the need for careful study of methods of network analysis and said that this country was not deficient in apparatus for network calculations, but there was scope for further development which could only be achieved by the application of both theoretical and practical considerations.

The first lecture, given by Mr. F. J. Lane (B.E.A.), was on the difficulties met in planning the development of a power system. Next a discussion was opened by Mr. C. H. Lackey (Reyrolle) on the most useful methods of handling short-circuit and load studies. Equivalent circuits for the representation of loads, underground cables and transformers were introduced by Mr. L. A. Gosland (E.R.A.) and Dr. J. R. Mortlock (B.T.H.) dealt with the representation of synchronous generators. Two sessions were devoted to methods of investigating the stability of power systems under the guidance of Mr. G. W. B. Mitchell (Merz & McLellan). The assembly then inspected the network analyser at Willesden (see *Electrical Review*, 14th November, 1947, page 737).

After a further discussion on the possibility of making greater use of computing machines, introduced by Mr. M. W. Humphrey Davies (Imperial College), there was a lecture by Mr. F. J. Lane on some of the practical considerations which were of necessity omitted from the main part of the course. To-day (Friday) there is to be a final discussion, with Mr. F. C. Winfield in the chair, reviewing the whole course with the object of stimulating further development and research.

Nile Scheme

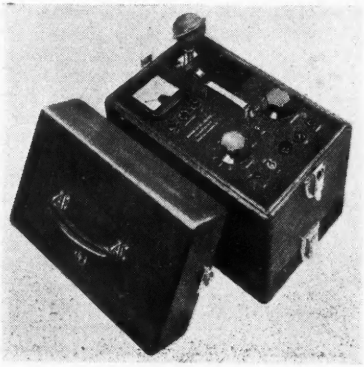
It is reported that the Egyptian Senate has approved the Government's proposal to contribute £4,500,000 towards the cost of the Nile power project.

Noise and Its Measurement

Tracing, Analysis and Reduction

By H. G. M. SPRATT, B.Sc., M.I.E.E.

THE undesirable effects of excessive noise must long have been realized, but only during the last thirty years have suggestions been made that something ought to be done about it. The tardy recognition that noise has a detrimental effect on health, that it is always disturbing and fatiguing, that it is a form of energy going to waste, has caused the subject to be given serious study. Investigations so far have brought to light certain important facts about its psychological effects. For example, the apparent loudness of a sound of constant low or medium intensity increases as the pitch rises and a composite sound is generally apparently louder than a pure note of the same strength. Again, annoyance is not synonymous with loudness as the former increases faster than the latter with rise in pitch and, moreover, interruptions, warbles and flutter all have contributory effects in this connection. Finally, the annoyance value of a sound is definitely dependent upon the background noise, being higher the greater the difference in intensity and pitch. All this is valuable data, since, for instance, it tells us that when we cannot eliminate a noise, we may be able to effect some alleviation by lowering its pitch.



Dawe sound level meter (Type 1400)

Without attempting any classification of the various types of noise, it is of importance to state that they can often be attacked at two different points, namely, the energy source and the noise source. These are not necessarily the same for it is usual to find that the energy source is a vibration or series of impulses exciting the noise source, such as a panel or air cavity or some similar sound conductor. Theoretically, we can, if we wish, direct our attention to one alone and ignore the other. In practice, it is much more likely that we shall have to reduce the effects of both, because it is impossible to eradicate either. Noise reduction problems can also take two different forms, *i.e.*, the elimination of noises in existing objects or structures and the design of silent objects or structures, a technique involving pure theory, use of previous experience and the *ad hoc* testing of models and parts.

Now, while it might seem reasonable that anyone with his unaided ears could investigate a noise problem, tracing the sources and estimating the approximate pitches and amplitudes, in practice it is often impossible to proceed very far in this manner, particularly in the absence of previous experience, so additional help has to be enlisted. It is the highest frequencies which are the most irritating, yet it is extremely difficult to gauge their pitch and number when they exist in company with low-frequency components.

Again, it may be easy to trace the offending element in a simple structure, but it is far more likely that we shall be faced with a complicated machine having a multitude of moving parts, or a building of many walls, partitions, windows, ducts, etc. Accordingly, to assist such investigations, a number of measuring instruments have been designed and, for any but the simplest problems, a judicious combination of instruments will be needed.

The position of the source is of prime importance and to help find it a vibration

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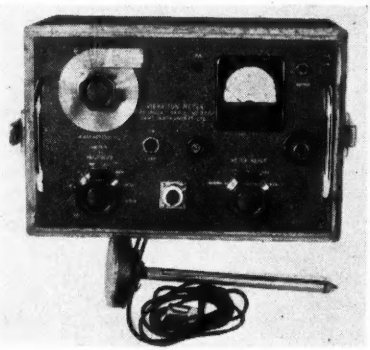
meter is of great value. One make consists of a crystal pick-up provided with a probe, an adjustable attenuator, a high-gain amplifier and an indicating meter. The probe is brought into contact with the suspected surfaces, the pick-up being connected to the body of the instrument by means of a lead. The meter will then read the acceleration, velocity, or displacement, of the surface over a frequency range of 2-1,000 c/s. The normal setting affords a measure of acceleration, but this is converted to either of the others by switching in integrating networks. Over this frequency range, therefore, one can determine the member with the maximum amplitude of vibration, and it should be borne in mind that if higher frequencies than 1,000 c/s are found to be present in the resulting noise they may have been caused by shock excitation from the lower frequencies.

Noise intensity can be measured by means of a sound level meter. Essential features are that it should have a constant objective response, that its frequency response should conform to the equal loudness contour of the human ear, that it should cover a wide range of intensity, and that it should be self-contained and



Dawe vibration meter (Type 1402) with pick-up probe

portable. It consists of a microphone of the crystal type, is nearly omni-directional, and has a good frequency characteristic. It also lends itself to use with a long extension lead on the microphone. The associated amplifier consists of r.c.-coupled stages feeding into a rectifier type of indicating meter. It has a naturally flat frequency response from 25-10,000 c/s but, because of the characteristic of the human ear, it is seldom used under these conditions except at high sound levels. More often the instrument is used with the characteristic deliberately modified to conform to the equal loudness contours at 40 and 70 phon level. Because of the subjective effects of sound level variation, it is important that whatever type of meter be used, its time constant should be similar to that of the human ear. In the particular type of instrument described, the meter is calibrated over a range of 16 db, while the amplifier has a gain switch of nine steps, each of 10 db. Such an instrument can also be used for vibration measurements by substituting a pick-up for the microphone.

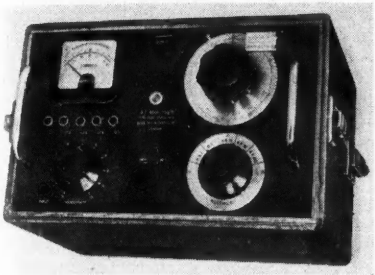
Audio-Frequency Analysis

Having dealt with the means of measuring the intensity of the sound and of tracking it to its source, we will now consider the a.f. analyser, an instrument which enables us to determine the frequency components. It is a 3-valve frequency-selective amplifier, using variable degeneration to obtain the frequency selection. On connecting it to the output of the sound level meter, one can explore the whole audio-range with the degenerative control and determine the relative values of the frequency components. Alternatively, if one uses the pick-up on the sound level meter, one can measure the relative strength of the vibration components.

Having determined the intensity and frequency composition of the noise and traced its source, we turn to the most difficult part of the task, namely, the reduction or alleviation of the annoyance. While there are several potential methods of carrying this out, in practice there is usually little choice left to us in any practical case.

The first step taken should be to examine the frequency spectrum as obtained from the a.f. analyser and look for any high-frequency components. If they are exact multiples of the driving frequency (50 c/s where an electric motor drive is used) they almost certainly originate from that frequency. Accordingly the motor should be examined to see if it can be quietened, or isolated from

the ultimate noise source, or its dynamic balance improved. If little can be done at the motor, attention should be turned to the excited member, possibly a panel or cover plate. It could be stiffened by reinforcement or replaced by another of thicker material. If stiffening by increased tension is attempted, the results



Dawe audio-frequency analyser (Type 1401)

will probably be worse as the panel is likely to resonate at a higher frequency.

Turning from panels and the like, insignificant air pockets can be bad offenders and should be suspect if the more obvious causes have been eliminated. A temporary change in the volume of the cavity or the insertion of damping material will immediately show, by a change in the shape of the spectrum, whether it is the source of the sound. Any such resonating cavity can generally be rendered innocuous by the fitting of permanent damping, a change in shape, or by drilling a number of relieving holes. The isolation of a motor or other vibrating unit can sometimes be effected by the provision of anti-vibration mountings such as steel or rubber springs. As a last resort a noise can sometimes be reduced to a sufficiently low level by total enclosure. This is usually a costly procedure and because of the possibility of parts of the enclosing structure vibrating, may cause much trouble before satisfactory results are obtained.

The reader may be inclined to think that the successful reduction of the noise is far more difficult than the execution of the preliminary tests and that the use of the instruments is, as a result, perhaps of relatively little importance. The first impression is correct, the second not. The instruments will be required constantly through the whole procedure. Temporary measures taken in seeking a solution and remedy may, because of their temporary character, produce too small an effect to be detected by the unaided ear, particularly when several noise components are present together, or when an appreciable interval elapses between the two observations. The instruments are, however, certainly more sensitive to small intensity and frequency changes than the ear and the calibrations remain constant. Accordingly, readings taken before and after a tentative change can be compared with complete confidence and the effect, if any, of the remedial step taken immediately interpreted.

Atomic Energy

AT the invitation of the chairman, Mr. H. Nimmo, a large audience which included the Mayor and members and officers of the Maidenhead Borough Council, prominent business men from the Maidenhead and Slough districts, and officials and engineers of the Southern Electricity Board recently heard a lecture by DR. T. E. ALLIBONE on the subject of "Atomic Energy" at the Town Hall, Maidenhead.

Dr. Allibone, who is director of the research laboratory of Associated Electrical Industries, Ltd., at Aldermaston, gave a clear exposition of the theory of nuclear power, and his skilful use of lantern slides, short films and models helped considerably to an easier understanding of the subject.

After dealing with the theoretical side and the early experiments, Dr. Allibone described the difference between Uranium 235 and 238 and showed by means of a film a probable method by which atomic bombs were "exploded." He explained the working of the atomic pile and, in particular, its application to the generation of electricity. He considered it quite possible that within three or four decades all the world's generating needs could be met by the use of atomic power, but emphasized the necessity for reaching international agreement regarding the disposal of plutonium, a by-product from the fission in the atomic pile, which could be used in the production of atomic bombs, before development on a large scale could proceed.

At the conclusion of his lecture Dr. Allibone was thanked by the chairman and by the Mayor of Maidenhead, who expressed his admiration of the lucid manner in which Dr. Allibone had made his subject understandable to a layman.

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Views on the News

By REFLECTOR

IT would be unfair to say that the great "switch-on" last Saturday went off at half-cock, but inevitably it was impossible to restore London's pre-war look in present circumstances. All of the equipment has been out of use for nearly ten years, and there has been neither time nor labour available to put it in order. Nevertheless, a brave show was made, and I am sure that the effort was worth while.

★ ★ ★

I have only one major criticism of the illuminations and that is that they are of a ten-year-old standard. Our people have not yet been able to take advantage of the developments which have been made in the art of public display during the last decade. Many of the advertisements retain a certain crudity. Colours are rather harsh and the matter forming the signs is sometimes capable of improvement. As regards the latter point, I am reminded of G. K. Chesterton's comment on New York's "Great White Way": "What a paradise for a man unable to read!"

★ ★ ★

Mr. Gaitskell has found it necessary again to assure the public that the improved lighting will not adversely affect the supply of domestic coal or the electrification of rural areas. He said that this work was going ahead as fast as conditions permitted, and mentioned that the Southern Electricity Board alone had connected up 1,000 farms during the past year. He might also have referred, I think, to the activities of the Eastern Board, which, as reported in the *Electrical Review* recently, has connected more than 1,000 farms since it took over.

★ ★ ★

The *Co-operative News* should bring itself up to date. In some "Fuel Hints" it refers to "the ban which is on all forms of space heating everywhere throughout the British Isles, other than coal or similar fires." This paper doesn't seem to know that this queer experiment in domestic restriction ended about two years ago; it was a measure introduced during the great fuel shortage of 1947. Another "hint" is that "water heaters should be turned off after lunch until next morning as even with a thermostat this will save current." This would certainly reduce the afternoon peak, but the morning load would be added to. This sort of misapprehension would be avoided if the Electricity Boards instituted and publicized special rates for night water heating.

★ ★ ★

I hope that I am not being pedantic, but I must enter an objection to a phrase which I have encountered several times lately. It occurs again in the March issue of *British Electricity* (the journal of the B.E.A.). Referring to the output of the Barking stations, the journal says: "This is the highest load ever sent out by the combined stations. . . ." I refuse to believe that a load can be "sent out"; if anything it is sent in.

★ ★ ★

One of the greatest joys for a youngster taken to an exhibition is the collection of as many books and pamphlets as possible—or it used to be when I was young. There is not so much paper now and so I suppose it is necessary for the Birmingham Chamber of Commerce in offering facilities for parties of senior schoolboys to visit the British Industries Fair to stipulate that "literature must not be taken from stands unless a master has first obtained the exhibitor's permission." This seems to be aimed at the masters, too.

★ ★ ★

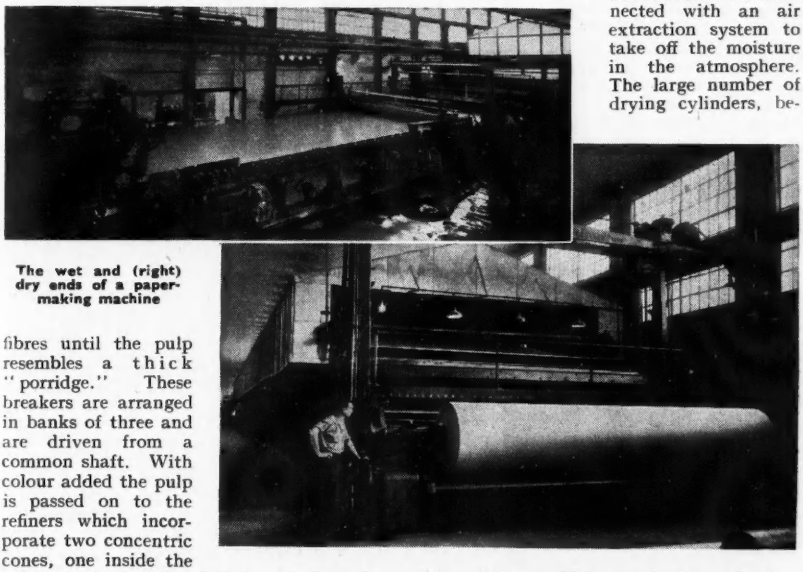
Is there an amateur illuminator in the industry who would be willing to give his services in a good cause? The form of illumination required has nothing to do with lamps and lighting; it is the ancient art of manuscript illuminating. The Electrical Industries Benevolent Association wishes to place a small framed parchment in Broome Park, recording how the mansion and grounds were given as a home for old people, and asks if anyone will undertake this little task as an appreciation of the donors' generous gift. The address of the E.I.B.A. is 32, Old Burlington Street, London, W.1.

Fibreboard Cases

LARGE-SCALE PRODUCTION BY ELECTRICAL METHODS

INTEREST of the electrical industry in the production of corrugated fibreboard cases is twofold. Not only are the cases used for the packaging of almost every electrical product but electricity plays a very important part in the manufacture of both the actual fibreboard and the cases. At the works of the Medway Corrugated Paper Co., Ltd., at Aylesford, a few days ago we had the opportunity of seeing the whole process of manufacture from the arrival of the wood pulp to the despatch of the finished cases.

Unloaded from barges in the River Medway by means of large electrically operated gantry cranes, the pulp is first tested for moisture content. The kraft pulp, together with size and alum, go for pulping into breakers or beaters which break down the fibres until the pulp resembles a thick "porridge." These breakers are arranged in banks of three and are driven from a common shaft. With colour added the pulp is passed on to the refiners which incorporate two concentric cones, one inside the other, to further the defibring of the pulp. The stock is then ready for paper making and is stored in the fine chest, where it is kept agitated and its consistency regulated.



The wet and (right) dry ends of a paper-making machine

The machines employed for making the paper used in the corrugated fibreboard are some of the largest in the world, the biggest one being 280ft long. The pulp pumped into the head box of the paper-making machine contains 99.5 per cent water. Bird screens clean the stock, and in the Brest box a series of baffles reduce the speed of flow to a Voith slice which finally regulates the speed at which the stock flows on to a continuous fine wire mesh band on which the paper is actually formed.

From this stage onwards all operations aim at reducing the moisture content. Besides supporting the wire mesh, table rolls take away a large amount of water by capillary attraction. Nine suction boxes extract further moisture before the sheet on the wire reaches a couch roll, which is a perforated roll having an internal vacuum box. Two sets of presses continue the process, the final drying being carried out on a series of about fifty steam-heated cylinders about 5ft in diameter. Canopies over the machines are connected with an air extraction system to take off the moisture in the atmosphere. The large number of drying cylinders, besides giving a high speed of production, also ensure high quality: the more gradual the drying the better the paper.

From the dryers the paper goes through the calenders, which impart a gloss to the sheet. The sheet of paper on the largest machine is 204in in width and is produced in the speed range of 200 to 800ft per minute, depending upon the type of paper being produced.

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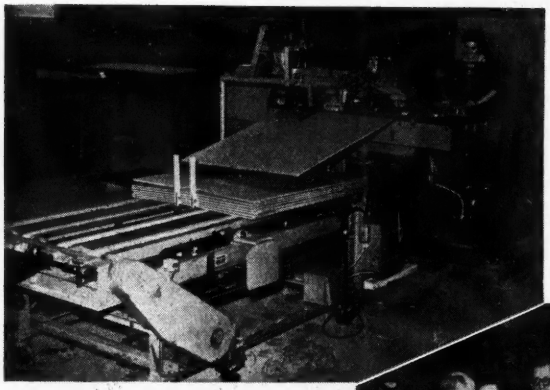
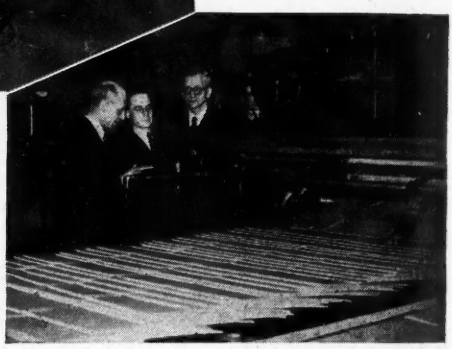
The drying cylinders are driven in most cases in groups of twelve by d.c. motors of about 110 h.p. Altogether about 800 h.p.





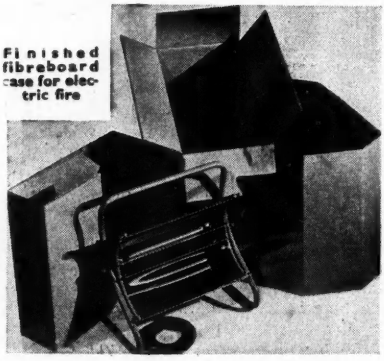
Automatic stitcher with electronic counting device, and (right) two-colour printer-slotter

of motors are required to drive the whole machine, each motor having its own speed regulator to provide for the synchronization which is obviously one of the greatest problems in an installation of this kind.

The paper, after being tested for strength, is cut and reeled into the required width and size.

The process of making the paper so produced into corrugated sheet is a continuous one and is carried out in what is probably the most up-to-date factory of its kind in the country. It consists of sticking a layer of corrugated paper between two flat layers of paper. First a sheet of paper fed from a roll is converted into corrugated paper by passing it between two fluted rollers, steam heated to about 400 deg F. The top sheet is then stuck to it by silicate of soda, followed farther down the machine by the lower sheet. After drying, the board is trimmed, cut to the required width and scored for bending where necessary and finally cut into lengths. About 200 ft by 7ft of board, in thicknesses of $\frac{1}{8}$in, $\frac{3}{16}$in and $\frac{5}{16}$in, is produced a minute. Four motors totalling 56 h.p. are employed to operate the machine.

A whole series of machines driven by small individual motors is provided for cutting and stamping the sheet out into the required sizes, printing, slitting, slotting, stitching, taping and finally tying in bundles. The automatic stitching machines are of special interest. An automatic elevator raises the pile of blank boards for convenience in feeding, while an electronic counting device transfers the stacked boards in batches in numbers as required to a conveyor. Electric elevating trucks are employed for conveying stacks of materials or finished products.



Finished fibreboard case for electric fire

Altogether the box-making plant employs about 250 h.p. of electric motors, and in addition there are about 100 kW of lighting and 200 kW of cooking load, and also an elaborate air-conditioning system. To provide the electricity for both the paper mills and the box works, and at the same time supply the large amount of process steam required, the company operates its own power station, which has a generating capacity of 30,000 kW and supplies about 100,000,000 kWh a year. In addition power is taken from the public supply for heating and for week-end working.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE British Electricity Authority has announced the following appointments: **Mr. J. W. Thomas,** B.Sc., LL.B., M.I.E.E., chief education and training officer, to be director of training, safety and welfare with effect from 1st April. Before joining the Authority in March, 1948, Mr. Thomas had been secretary of the British Engineers' Association for four years. **Mr. S. S. Scott,** M.A., deputy director of establishments, who has been appointed deputy chief labour relations officer with effect from 1st April, was the staff officer of the Northmet Power Co., with whom he had served for twenty-six years, before joining the B.E.A. **Mr. R. D. V. Roberts,** B.Com., deputy welfare officer, becomes secretary to the National Joint Advisory Council with effect from 27th January. He was formerly deputy chief districts officer in the Miners' Welfare Commission. **Mr. R. G. Bellamy,** O.B.E., M.Eng., M.I.Mech.E., deputy education and training officer, is appointed education and training officer with effect from 1st April. Before joining the B.E.A. he was one of H.M. Inspectors of Education.

Mr. E. A. Pitcher, joint general manager of the Fraser & Chalmers Engineering Works of the General Electric Co., Ltd., has retired after over fifty-five years' service. Mr. Pitcher joined Fraser & Chalmers, Ltd., in 1893, and was later appointed personal assistant to the managing director. In 1914 the executive staff moved from London to the works at Erith, and he became personal assistant to the general manager. He was appointed commercial manager in 1918 when the works were taken over by the General Electric Company, and joint general manager in 1938.

Mr. E. A. Pitcher

Mr. G. F. Mansbridge, O.B.E., M.I.E.E., retired from the board of the Dubilier Condenser Co. (1925), Ltd., on 31st March. Mr. Mansbridge has been connected with the condenser industry for fifty years and his first condenser patent was applied for in 1899.

Mr. T. Hands, O.B.E., has been appointed director of manufacture in the Edison Swan Electric Co., Ltd., and relinquishes his title of general manager—valves. **Mr. E. Yeoman Robinson** has been appointed chief engineer and manager—valves.

Mr. R. A. Rowbottom, A.M.I.E.E., has recently been appointed works manager of Ferguson, Pailin, Ltd. Mr. Rowbottom has been in the company's service for over twenty-six years, for the last eighteen as superintendent of the Outside Erection Department.

Mr R A. Rowbottom

Mr. G. Kirby

Mr. G. Kirby, who succeeds Mr .Rowbottom as superintendent of the Outside Erection Department, has been chief assistant superintendent of that department for the past ten years.

Mr. J. A. C. Allum, C.B.E., J.P., managing director of the Allum Electrical Co., Ltd., Auckland, N.Z., is leaving Auckland by the s.s. *Tamaroa* this month for a visit to this country, and expects to arrive in England towards the end of May. While in England his address will be c/o the New Zealand High Commissioner, 415, Strand, London, W.C.2.

After fifty-one years' service in the electricity supply industry **Mr. A. N. Urquhart,** of the South Western Electricity Board and of the former North Somerset Supply Co., retired on 31st March, when he received a presentation of an antique oak writing desk from his colleagues. The presentation was made by Mr. F. Christy, who was chairman of the North Somerset Supply Co. until nationalization of the industry. Mr. H. Midgley, deputy chairman of the South Western Electricity Board, paid tribute to Mr. Urquhart's long and loyal services. Also present were Mr. E. C. Willis, Sub-Area manager, and Mr. E. W. Tole, senior executive officer. Mr. Urquhart, who is the retiring chairman of the Bristol Electric Club, will continue to live in Bristol after he has had a holiday in his native Scotland.

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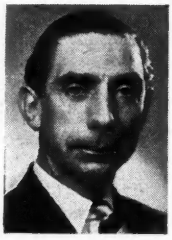
Austin Crompton Parkinson Electric Vehicles, Ltd., announces that, as from 1st March **Mr. F. Spalton** has been appointed sales promotion manager.



Mr. F. Spalton

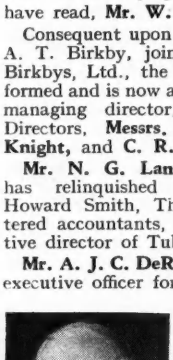
Mr. Spalton, who has taken over control of the newly established Sales Promotion Department, has a wide knowledge of sales problems affecting electric vehicles, having been with the manufacturers of Morrison Electricars both as area manager and also as a branch manager.

We regret that in recording the registration of the Electric Construction Co. (Small Motors), Ltd., in our last issue, the initials of the first of the three directors mentioned were incorrectly given. The name should have read, **Mr. W. M. Furniss.**

Consequent upon the recent death of Mr. A. T. Birkby, joint managing director of Birkbys, Ltd., the directorate has been reformed and is now as follows: Chairman and managing director, **Mr. F. E. Birkby.** Directors, **Messrs. J. N. Stone, R. S. Knight,** and **C. R. Williams.**

Mr. N. G. Lancaster, M.B.E., A.C.A., has relinquished his partnership with Howard Smith, Thompson & Co., chartered accountants, on becoming an executive director of Tube Investments, Ltd.

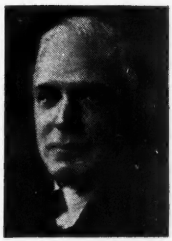
Mr. A. J. C. DeRenzi, A.M.I.E.E., senior executive officer for the Newcastle (Staffs) area of the Midlands Electricity Board, retired on 31st March. Mr. DeRenzi went to Newcastle in December, 1905, as assistant engineer, and in 1908, at the age of twenty-five, was appointed borough electrical engineer. Mr. DeRenzi served on the Council of the Incorporated Municipal Electrical Association from 1938 to 1948, on the District Joint Industrial Council for the Electricity Supply Industry and the British Electrical Development Association for over twenty years, and he was, with Alderman S. Myott, the founder of the Smaller Municipal Electricity Supply Undertakings' Association in 1936-37, and held the position of hon. secretary from its inception. Mr. DeRenzi is not retiring from active work, as on 1st April he took up full-time duties as secretary of the National Municipal Electricity Consumers' Association. His business address is Hawthorne House, Merrial Street, Newcastle (Telephone: 661071 Newcastle, Staffs).



A. J. C. DeRenzi

At the annual general meeting of the Electrical Sign Manufacturers' Association, held on 22nd March, Mr. **A. E. Beadnell,** of Elders Walker & Co., Ltd., Gateshead, was elected chairman in succession to **Mr. J. F. Aldridge,** and **Mr. J. G. S. Campbell,** of the Franco-British Electrical Co., Ltd., London, was elected vice-chairman.

Mr. G. F. O'Dell, C.B.E., B.Sc., M.I.E.E., Director of Contracts, G.P.O., retires on 11th April. He commenced his career with the Post Office Engineering Department in 1909 and served in that Department for over thirty-one years, becoming Assistant Engineer-in-Chief. He was a specialist in automatic telephone exchange maintenance and his contributions to the theory and standardization of telephone trunking were of outstanding and international importance. In April, 1941, when the Post Office Contracts Department was formed, he took over the post of Deputy Director of Contracts and become Director in 1946. He will be succeeded by **Mr. A. G. Robertson,** M.M.



Mr. G. F. O'Dell

Mr. N. Marsden, technical export manager of Henry W. Peabody & Co., of London, Ltd., is leaving this country by air on 22nd April for an extended tour of South Africa, the Rhodesias and East Africa. He will be away for approximately two to three months. **Mr. J. K. Hodgson** left for India and Pakistan on 6th April and will also be away for from two to three months.

On his retirement from the position of manager of the No. 3 (Sheffield) Sub-Area of the Yorkshire Electricity Board, **Mr. J. R. Struthers,** M.I.E.E., was presented with a portable typewriter and a handbag for Mrs. Struthers by the staff and employees of the former Sheffield Corporation Electricity Department, now employed by the No. 3 Sub-Area, Yorkshire Electricity Board and also the Yorkshire Division (Generation). He was also presented by the chief officers of Sheffield Corporation with a canteen of cutlery. Various consumers in the Sheffield area presented him with gifts, and he has been invited to presentation dinners and luncheons after his retirement. His future address will be "Rockmount," Millhouses Lane, Sheffield, 11.

The Southern Centre of the **Institution of Electrical Engineers** is holding a conversazione and dance on 6th May at the Grand Hotel, Bournemouth, for the benefit of those members of the Centre living in the Western area who were unable to attend the dinner and dance at Portsmouth. Tickets (10s 6d each for members and visitors and 7s 6d single, 15s double for students) can be obtained from Mr. A. R. Hudson, 63, Elmes Drive, Millbrook, Southampton, or from Messrs. A. W. J. Hunt and W. M. Read, Southern Electricity Board, 1, Priory Road, Bournemouth.

Obituary

Mr. B. Hogarth.—The General Electric Co., Ltd., announces that Mr. B. Hogarth, manager of the Paris Works of Chamberlain & Hookham, Ltd. (a subsidiary of the G.E.C.) since 1919 and a director of General Electric de France, Ltd., died on 26th March in Paris at the age of sixty-five. Mr. Hogarth spent practically the whole of his life in the service of Chamberlain & Hookham, Ltd. He was in charge of their German subsidiary, Solar Zähler Werke mbh., Hamburg, until 1914, when he was interned during the war. More recently he was again interned as a civil prisoner in Paris during the German occupation.

Mrs. P. G. Hieatt.—It is with regret that we learn of the death, which occurred on 2nd April, of Mrs. P. G. Hieatt, wife of Mr. P. G. Hieatt, personal assistant to the Controller, Yorkshire Division, British Electricity Authority.

Wills

Lord Ashfield, P.C., T.D., late chairman of the L.P.T.B., a member of the Transport Commission, and chairman and managing director of the Northmet Power Co., who died on 4th November last, left £59,971 gross (£50,284 net).

Mr. S. Rose, a director of the Wholesale Fittings Co., Ltd., who died on 13th October last, left £22,814 gross (£19,078 net).

Mr. F. C. Mannox, managing director of Murex, Ltd., who died on 21st October last, left £6,276 gross (£4,492 net)

Sir William Ronald Graham, P.C., G.C.B., G.C.M.G., G.C.V.O., chairman of the Lincolnshire & General Electric Supply Co., Ltd., and the Mid-Lincolnshire Electric Supply Co., Ltd., who died on 26th January last., left £79,953 gross (£78,991 15s net).

Mr. F. C. Mann, manager of the East Devon Electricity Co., who died on 18th January, intestate, left £3,966 gross (£3,925 net).

Radio Component Testing

A SPECIFICATION describing the general conditions and procedure for the durability testing of components for radio and other electronic equipments has just been published by the Radio Industry Council, 59, Russell Square, London, W.C.1, price 1s.

This Specification No. RIC/11 is the work of the Council's Technical Specification Committee in consultation with the British Radio Equipment Manufacturers' Association, the Radio Communication and Electronic Engineering Association and the Radio Component Manufacturers' Federation. It is the first specification to be produced by the Committee and covers approximately the same ground as the Inter-Services Specification No. RC.S/11, but caters for industrial requirements as distinct from those of the Services. It has not yet reached the stage of consideration by the British Standards Institution.

Australian News

THE Victorian Government has decided to grant the sum of £250,000 towards the cost of establishing a central generating station at Mildura in the heart of the fruit country. Announcing this, Mr. P. T. Byrnes said that the project would cater for further secondary industries, thus giving a more balanced economy.

In Queensland the following apparatus must not now be sold to the public without approval of the State Electricity Commission: Toasters, grillers with open elements, radiators, portable immersion heaters, kettles, saucepans, jugs, irons, wall switches, soldering irons, portable handlamps, lampholder adaptors and electric razors. Applications for approval must be accompanied by a sample and photograph of the article, copy of the approval certificate and test report, complete specifications, and a fee of 10s (wall switches and lampholder adaptors 5s).

E.I.B.A. Target

THE Electrical Industries Benevolent Association tells us that during March, towards its target of £33,000 for the year, i.e., £2,750 a month, £1,159 was received, which represents a deficit of £1,591 in the month. In the first three months of the year, therefore, the Association is £3,387 short of the target. The amounts of £50 and over subscribed during March were as follows: Crompton Parkinson, Ltd., £250; Electrical Power Engineers Association, £63; Westinghouse Brake & Signal Co., Ltd., £50. In addition a "special effort" made by the E.I.B.A. Birmingham Branch brought in £243.

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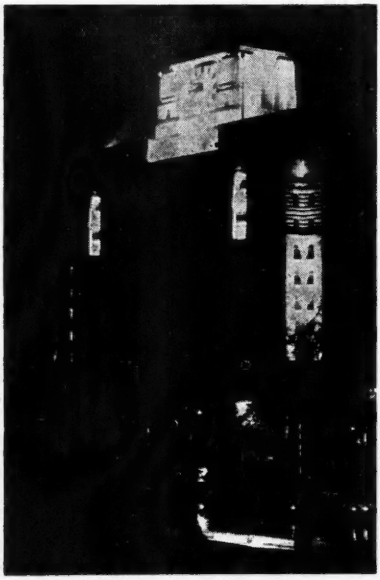
Lighting Restrictions Relaxed

RESUMPTION OF ILLUMINATIONS

CONSEQUENT upon his recent announcement in the House of Commons, the Minister of Fuel and Power has made the Electric Lighting (Restriction) Order, 1949 (S.I. No. 633), which came into operation on 2nd April. The chief consequences of the Order are that there are no restrictions on the use of electricity for display or advertisement purposes until October this year. After that date, electricity taken from the public supply may not be used for these purposes between the times of 7 a.m. and 7 p.m. on Monday to Friday inclusive



The floodlighted clock at Shell Mex House on the Embankment is once again a London landmark at night

because of the difficulty in meeting the peak load. There will, however, be no restrictions outside these times. The restrictions on the use of electricity generated by private supply are completely removed.

The restriction on the standard of interior lighting permitted in shops, hotels and catering establishments has also been withdrawn entirely until 2nd October, but after that date, interior lighting will have to be restricted to the present standards between the hours of 7 a.m. and 7 p.m. on Mondays to Fridays inclusive.

In spite of the shortness of the time since the lifting of the ban was announced there was a good display of illuminated signs in the West End of London on Saturday. The attraction of the lights was strikingly demonstrated by the crowds which assembled to witness the switching-on—those in Piccadilly are estimated to have been the biggest since the end of the war.

In the provinces, Brighton, aptly enough, was one of the brightest spots. The *Sussex Daily News* records that the lines of the Palace Pier were etched in light; "Brighton Greets You" shone in crimson; West Pier was floodlighted, and the Old Steine Gardens transformed by myriads of fairy lights.

Floodlighting in West Country

Our Bristol Correspondent reports that there was a big switch-on in many towns in the West. Bristol itself lost so many signs in the bombings that two-thirds of them were out of action, but the recently completed Electricity House and the *Evening World* premises at the Centre were floodlighted. The Cabot Tower was a fine sight, and another attraction was the Victoria Rooms fountain illuminated in colour.

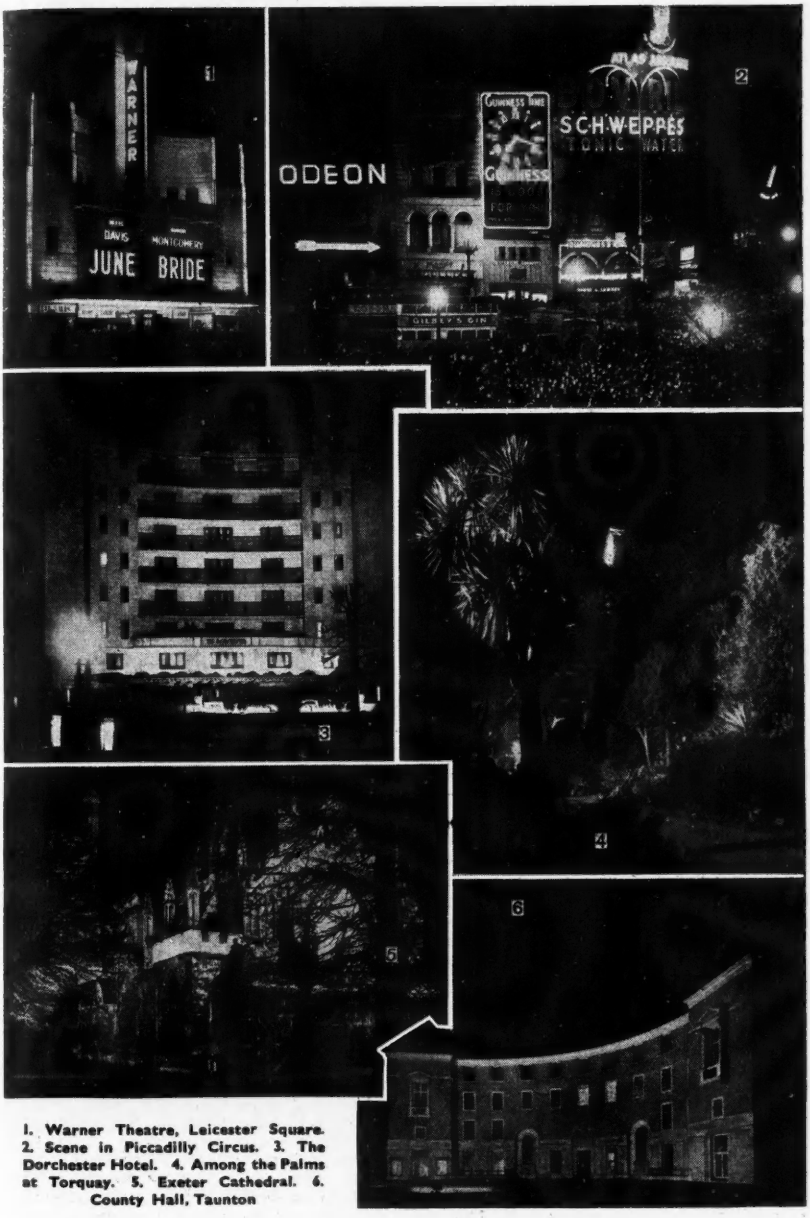
At Bath, the Sham Castle, Holburne Museum, City Weirs and Pulteney Bridge, the Abbey Tower and West Front, the Pump Room and the Electricity Service Centre were illuminated. Plymouth Guildhall, the Municipal Bulidings at Taunton and Bridgewater were other examples of effective floodlighting.

Altogether twenty-four public buildings were illuminated by the South-Western Electricity Board, whose policy it is to encourage the use of electricity wherever possible, particularly loads such as floodlighting and display lighting outside the peak periods.

Torquay was better prepared than most places for the lifting of the ban, for a substantial sum had been spent on equipment and rewiring Besides the illumination of the Rock Walk, Town Hall Pavilion and Marine Spa, hotels and other private establishments contributed their quota.

Southport's illuminations are to be inspected by a Merseyside and North Wales Electricity Board engineer, who will report on how soon they can be switched on.

At Scarborough estimates are being prepared for strip lighting on the sea front, Peasholm, main shopping street and Valley Road, and for floodlighting the War Memorial and Castle.



1. Warner Theatre, Leicester Square. 2. Scene in Piccadilly Circus. 3. The Dorchester Hotel. 4. Among the Palms at Torquay. 5. Exeter Cathedral. 6. County Hall, Taunton

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Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Surcharge-Rebate

IN accepting the recommendation of a committee which he had set up to advise him and on which the electricity supply industry was well represented, the Minister of Fuel and Power followed a perfectly legitimate course, and there seems to be no reason to bring in "politics."

I suppose that the surcharge and rebate of 0.35d and 0.1d, respectively, were chosen because they were the nearest suitable round figures. If x denotes the proportion of the annual consumption taken in the surcharge quarter, the following equation gives the percentage increase, p, in total annual unit charges over the corresponding pre-surcharge minimum amount, calculated at 0.75d per unit: $p = (45x - 1{,}000)/75$. A few specimen values are shown below:—

x (%)	25	30	35	40
p (%)	1.6	4.7	7.6	10.7

Mr. B. Gill's x (your 4th March issue) was 40 per cent, and Mr. J. Ashmore's average (18th March), 29 per cent. If the latter had maintained his 'average" performance, his p would have been 4 per cent, and if the fixed charge is also taken into account, the relative increase may be described as trifling. Even assuming that the average pre-surcharge x of all consumers was 35 per cent, the corresponding increase in the average annual bill (including fixed charge), *without response to the surcharge*, would be well below 7.6 per cent, and by reducing his x from 35 to 30 per cent (i.e., by 14 per cent) the average consumer could have cut this relatively small increment to nearly half. I would suggest that, to be fair, comparison must be on a percentage basis, and not on extra cost in pounds, shillings and pence.

In conclusion, the decisive question remains: Has the surcharge been sufficiently effective in making the average consumer less "switch-happy," i.e., in reducing peak demands, during the coldest quarter? It is on this point that authoritative elucidation would be particularly welcome.

ELECTRICUS.

"Fair Trading"

MAY I point out to Mr. Lowe that he has the telescope to his blind eye. Few small contractors can hope to buy in so large quantities as the B.E.A., and there will thus be a high price for the small man and a low price for his gargantuan competitor. If this is "fair" the word must have acquired a new meaning.

NEMO.

Clothes Washboilers

THE article by Mr. E. A. Robbins on the staining of clothes, in your 25th March issue, has thrown a very interesting light on a most elusive subject.

His research into the problem has provided the industry with some very useful information. I feel that we should pass a word of thanks to the writer.

B. GRANGER-BEVAN.

Pontllanfraith, Mon.

Steel Economy

A FOUR-DAY conference on "Welding as an Aid to the Saving of Steel and Manpower," organized by the British Welding Research Association and the Institute of Welding, was opened by Sir Andrew McCance, D.Sc., F.R.S., at Ashorne Hill, near Leamington Spa, on 22nd March, 1949.

The 200 executives, engineers and designers who attended considered the saving in steel and manpower which can be achieved by the application of welding to machine tool construction, in replacement of castings in general engineering factories, in shipbuilding, railway and structural engineering. It was concluded that while a considerable saving is at present being achieved, further economies could be effected by an increase in the use of welding and in more informed application in many of the fields in which it is being used.

Vigorous steps should be taken to disseminate the knowledge of the advantages of welding, of correct welded design and of the available welding processes and production methods. This information should reach in particular designers, draughtsmen, planning and production engineers.

South-Western Industry

AIDS TO EFFICIENT PRODUCTION

A SERIES of tours of the industrial regions is being organized by the Ministry of Supply and last week we participated in one covering the South-Western Region, of which Mr. J. H. Larrard is Controller.

The Garrard Engineering Co., Ltd., at Swindon, was the first concern visited (on 30th March). In this works clocks and gramophone motors, including record changers, are the principal products and this presents a good example of precision engineering. The company can also claim to have built up in this country an industry which before the 1914-18 war was practically wholly carried on abroad—mainly Germany.

Standardization of parts has been achieved to a remarkable degree and consistency of production is maintained by an extensive system of quality control. The works employ about 1,600 people and between 60 and 70 per cent of the output is exported.

Varied Railway Work

In the afternoon the party went on to Chippenham and inspected the extensive works of the Westinghouse Brake & Signal Co., Ltd. Although the bulk of the products are as implied by the company's name (and this covers all kinds of railway work and colliery work), there is a very substantial business in rectifiers which find application in innumerable ways.

An extensive foundry produces the ferrous and non-ferrous castings used in the company's equipment and adjacent to it is a die-casting department operating both the pressure and gravity methods. Stamping, forging and welding processes were examined and a brief inspection was made of the well-equipped machine shops. After seeing other processes the party was shown the assembly of some of the power interlocking signal frames—a very complicated job obviously requiring the utmost care.

Pneumatic brakes for railway and road vehicles and their associated compressors form a most important section of the company's work; most of the compressors are, of course, electrically driven.

The rectifiers (of the copper-oxide and selenium types) are produced in a very wide range to meet requirements extending from radio to railway work.

Thorough testing, electrical, mechanical and optical, is carried out in departments well laid out and equipped for the purpose. The company has recently opened a new laboratory for the examination of the raw materials as they are delivered. Here they are put through electrical, chemical, metallurgical and physical tests as required.

The time allowed for the tour was insufficient for the visitors to gain more than a general impression of the works and their ideas were somewhat clarified by an exhibition which the company had arranged at the Town Hall for the benefit of employees' relatives and the public generally. Here they were working exhibits and models of much of the equipment made at Chippenham. We have seldom seen a display so well set out and so lucidly explained to the layman.

The Westinghouse Co. employs about 2,700 people (400 women). Its products are very well known all over the world; about 60 per cent of its output goes overseas. The company has excellent training schemes for engineering and trade apprentices.

Frozen Food Cabinets

The morning of 31st March was devoted to an inspection of the works at Fishponds, Bristol, of George Parnall & Sons, Ltd., whose main products are shop, store and ship furniture; metal furniture; milk processing equipment; and refrigerating plant. Most of the equipment for shops and ships is made to individual orders; the company prepares the designs and does the fitting.

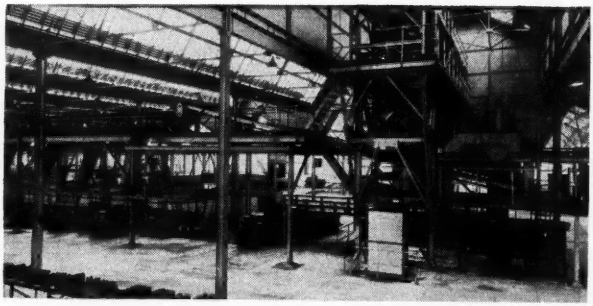
The party was shown numerous examples of display cabinets for quick-frozen foods. In these the trays are mounted on the edges of freezing panels and incoming air is drawn up over a finned cooler in a canopy at the rear.

Automatic defrosting devices are incorporated.

Milk coolers and heaters form a large proportion of the works output. Rapid and clean seam welding of the containers is accomplished by means of argon arc equipment operating at 20in a minute.

There is also an efficient mechanical enamelling and drying plant and an extensive overhead conveying system which helps to keep the factory floor clear. Approximately a thousand people are employed.

Brecknell, Munro & Rogers, Ltd., Bristol, were visited in the afternoon. Here the main products are automatic egg-grading machines, automatic coin-operated machines and apparatus for moulding, wrapping and weighing butter and margarine. The company also handles a line of small high-speed printing machines and food preparation machinery.



Section of R. A. Lister & Co's fully mechanized foundry showing conveyor systems for moulds and sand-handling plant

Although these are not electrical machines in the strict sense, they depend on electricity for their operation. The visitors were intrigued by the mechanical ingenuity of the apparatus demonstrated for them—particularly a machine for weighing out flour, filling paper bags and closing up and securing them.

Success has been won in overseas markets by the company's butter packing machines; about 70 per cent of these are exported. Overall, half of the works output goes overseas.

Relations between the 1,000 workers and the management are very good. The company's policy is to "up-grade" its employees as vacancies occur. All the present directors have come up this way. A profit-sharing scheme is in operation.

On Thursday evening Mr. Larrard presided at a dinner at the Grand Hotel, Bristol. The principal guest was Mr. J. H. Jones, Joint Parliamentary Secretary to the Ministry of Supply, and there were present representatives of manufacturers in the South-Western Region. In a speech Mr. Jones stressed the need for improving the means of production in view of the shortage of manpower and materials. He instanced as three main directions in which this could be sought, standardization, quality control and factory layout. There was also adaptability to changing needs and the study of human relationships in the factories. He concluded by emphasizing the need to cultivate the Canadian market.

On Friday morning (1st April) we went on to Dursley (Glos) to the extensive establishment of R. A. Lister & Co., Ltd., an 80-year-old concern which has managed to hold the "family" atmosphere in spite of tremendous growth; the board consists of five brothers and Sir Percy Lister is chairman. Primarily agricultural machinery makers, the firm still finds most of its work in this sphere.

A large part of the works' production comprises petrol and diesel engines in sizes of from 1.5 to 60 h.p. Larger engines are made by the company's associate, Blackstone & Co., Ltd., Stamford. Many are combined with generators with outputs of from 0.75 to 23 kW. Three sizes of "Start-o-Matic" sets are made; these are put into operation immediately a load is switched on and cut out when it is switched off. Marine propulsion and auxiliary engines (7 to 60 h.p.) are also made at Dursley.

Lister "Auto-Trucks," first produced in 1927, are now seen everywhere as they form a most convenient method of handling loads in small spaces and in difficult turns. Listers claim to be the largest

makers of cream separators in the British Commonwealth and the Dursley works produces for export only. The company also has a very large business in sheep-shearing machines. An outstanding feature of the Dursley works is a large highly mechanized foundry.

The company's three thousand employees enjoy many amenities. Free medical and dental attention in well-equipped clinics has been available for some years and there are works benevolent and pension funds. Recreational facilities, of a widely varied character are operated by a separate company in which the bulk of the shares are held by the employees. A dividend of 6 per cent is guaranteed by the company but actually 10 per cent free of tax is being paid at present.

From the earliest days the company has been active in export trade. It has subsidiary companies in several countries, including the United States, Canada, Argentina and Australia, which distribute and service Lister products. There are also efficient distributing agents in most other important overseas markets.

Development in the South-West

BOARD'S £2,000,000 SCHEME

THE South Western Electricity Board's development plan for the next few years concentrates on strengthening and extending the main network in the Area. More than 400 miles of 33 kV overhead lines will be constructed and nearly 50 new switching and transformer stations equipped. These particulars of the recently announced £2,000,000 scheme (see *Electrical Review*, 1st April, p. 551), were given by the Board's chairman, Mr. S. F. Steward, when he spoke on rural development plans to the Devon County Branch of the National Farmers' Union at Exeter last Friday. Nearly a quarter of this expenditure will centre around Plymouth in order to provide an adequate supply for West Devon and West Cornwall and to meet the needs arising from Plymouth's reconstruction. Mr. Steward stressed that until the primary network had been considerably strengthened, there could be no large-scale extension of supply to consumers' premises.

The Electricity Board, he said, was at present working on the principle that development, including that of rural areas, must be economically self-supporting. The present systems of raising capital contributions from rural consumers were admittedly not ideal, but they could not be dispensed with until there was a more satisfactory alternative, the nature of which would depend on whether rural development was to be dealt with on an area or a national basis. If it were decided to adopt an area basis, it might be necessary to carry the extra cost throughout both the urban and rural districts. On the other hand, it might well be that the right solution was to look at the whole problem nationally in the first place. In this case an area such as the South West, with large undeveloped rural territory, would need a specific contribution in aid of its rural development programme. But it should not be assumed that national assistance would be on a scale that would relieve the rural population of all need to contribute towards the relatively higher cost of making supplies available. The form of tariff to cover the supply of energy to farms was another matter that would also have to be decided at national level if there was to be a uniform basis of charge for farms all over the country. This question was already being considered by the Area Boards and the B.E.A.

In the S.W. Area only about one-eleventh of the total of 5,500 square miles was urban. Less than half the area was within reach of the existing electricity network, and out of over 34,000 farms and holdings of five acres and above only 7,000 were connected to the mains. Ultimately it was only by increasing sales of electricity that the Board could expand the supply and reduce its cost. Farmers in the South West who had a supply were not taking advantage of it to anything like the extent possible. One-third of those farms with a supply used it for domestic purposes only, and an even higher proportion used it in their farm buildings for lighting only.

The South Western Board's rural survey would show how the development of the area as a whole could best be planned to satisfy simultaneously financial and engineering requirements. The first stage, now virtually complete, consisted of a preliminary reconnaissance. The second stage would be a detailed survey of localities carried out in the order in which it would be possible to bring supply to them. This planned development, which had only become possible as a result of nationalization, should show considerable saving in capital costs.

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Electrical Supervisors

INDUSTRY'S RECORD AND PROSPECTS

AMONG more than 450 members and guests of the Association of Supervising Electrical Engineers who attended its annual dinner and reunion on 1st April were the eight past-presidents who are still with us. On the motion of this years' holder of the office, Mr. A. G. Ramsey, the company paid silent tribute to the memory of the first president (1914), the late Mr. A. H. Dykes. The first executive chairman, Mr. J. M. Crowdy, was among several notable personalities absent owing to influenza. These included Sir Ewart Smith (director, Imperial Chemical Industries), who was to have proposed the toast of "The Electrical Industry." This duty was taken at short notice by Mr. G. P. Barnett (Chief Inspector of Factories), whose main theme was the promotion of safety in industry.

Low Accident Rate

In spite of an increase in the consumption of electricity in Great Britain from 6,000 to 42,000 million kWh since 1926 (the year of the decision to establish the national grid system), the number of notifiable accidents in 1947 was only 734, compared with a pre-war annual average of 600. This disproportionately low rate of increase he attributed largely to the foresight exercised in drawing up the Safety Regulations in 1908. The large proportion of accidents in which switchgear, portable apparatus and flexible cables were involved, however, pointed to opportunities for improvement. New developments introduced new risks; thus the risks with electronic apparatus at above 100 kc/s frequencies were of burns rather than of shock. The British Electricity Authority was setting up joint safety committees with industry, with the co-operation of his Department.

Responding, Mr. T. G. N. Haldane (president, Institution of Electrical Engineers) claimed that the electrical industry could be justifiably proud of exporting 231 per cent of pre-war goods. He believed that the increase in consumption of electricity during the next twenty years would be of the same order as in the last, which was five-fold in kWh and four-fold in maximum demand. Although consumption per head in the United States was twice that in Great Britain there was no sign of saturation there, and greater mechanization of industry here was essential. Much higher voltages would be needed, and such developments would benefit export trade also. Moreover, electrification would encourage the best uses of fuel resources. Although water power and wind power would furnish only a small fraction of power requirements, in the aggregate they were likely to be of importance

In proposing the health of "The Guests," the president referred to the need for a broader outlook among engineers desirous of reaching the top of their profession, on the lines of Mr. Haldane's inaugural address as president of the I.E.E. He referred to the work of Prof. R. O. Kapp as leader of a voluntary band of examiners in connection with the award of the Swann Diploma, which, as a hallmark of a good engineer, was supported by all the past-presidents.

Professor Kapp, in reply, suggested that the customers (i.e., employers) should draw up the specification for what they required in engineers. A need for high technical qualifications could be assumed, but they must also be collaborators, since no profession was so dependent on team work. Regarding the Swann Diploma, the technical standards were not too high for members of the Association and provision was made for experience and ability to handle men. University training and degrees were required for only a small proportion of the very varied engineering field, the bulk of which was within the scope of the Higher National Certificate.

Students' Joint Meeting

THE annual joint meeting between the Association of London Students of the Institution of Civil Engineers, the London Graduates' Section of the Institution of Mechanical Engineers and the London Students' Section of the Institution of Electrical Engineers was recently held at the Institution of Civil Engineers, Great George Street.

A large gathering heard three short papers on "The Development of the British Road System," "Motor Vehicle Development from Specification to Production Design" and "Present Day Street Lighting." All were well written and presented, the first and the last particularly holding interest with some panoramic views of main roads through the country, and street lighting effects. The three authors were plied with questions and, with some collaboration on the knottier ones ("Are non-skid surfaces more difficult to light?"), emerged with enhanced reputations.

Overhead Line Regulations

REVISION BY I.E.E. CODE OF PRACTICE COMMITTEE

REGULATIONS relating to the design and construction of overhead power lines are reviewed in a Supply Section paper presented by MR. H. W. GRIMMITT (Ministry of Fuel and Power) at an ordinary meeting of the Institution of Electrical Engineers last week.

The paper first traces the background of the existing regulations for which the former Electricity Commissioners were responsible, and then examines their revision by the appropriate Code of Practice Committee. His object is to elicit criticism that may help to complete the proposed draft.

The basic differences are that, except where specifically stated, the proposed Code will govern all types of line from low to the highest voltages. All half-measures of cradle guarding against conductor breakage have been eliminated and reliance for safety is to be placed on specified loading conditions, adequate earthing and good workmanship, except where the G.P.O. may require particular precautions.

The new proposals include an empirical formula for stringing conductors which is standard throughout the whole range of voltages and conductor sizes. A direct wind load is specified for designing supports and foundations.

The term "factor of safety" has been discarded, so that only one "stress" will need to be considered in calculations. It is the load at which failure, or permanent distortion, is likely to occur. Lines constructed in accordance with the new Code should be virtually safer and are expected, in many cases, to be cheaper than those designed in the old way. The revised regulations specify minimum conditions, thus permitting the exercise of discretion in areas where weather is likely to be abnormal. There is not considered to be any serious argument for different conductor loadings in different zones in this country. The draft Code is based on past experience and the E.R.A. investigations.

DISCUSSION

SIR JOHN KENNEDY (Uganda Electricity Commission), a former Electricity Commissioner, welcomed the proposed new Regulations, but expressed the hope that nothing in Regulation 4 would mitigate against the use of under-eaves construction, which helped to preserve the amenity of small towns and villages. Experience of hundreds of miles of this construction in Northern Ireland had, he said, proved entirely satisfactory and had led to no accidents whatever, but the cable makers had ceased to manufacture the very simple form of conductor there employed. The cable which they now put forward for this purpose was so expensive that it was no longer an economic proposition. He hoped that the Area Boards would induce the cable makers to provide a suitable and economical cable for the purpose.

He hoped that the assistance of the Institution would be invoked in the revision of other regulations which were in need of amendment, such as the old Regulations of the Commissioners for ensuring the safety of the public and a proper and sufficient supply, and the Factory Regulations, while those applying to the new nationalized industries should also be brought into line and co-ordinated. It would be of great advantage if all the regulations could be printed in a common form, so that they could be bound up together.

"Factor of Safety"

MR. H. NIMMO (Southern Electricity Board) asked whether it was necessary to have four sets of clearances in draft Regulation 6 and suggested that two might be adequate. The new Regulations, he said, would make a valuable contribution to the cheapening of overhead lines and, if substantially accepted, would mean that overhead line construction in this country would compare very favourably with that in any other. His only serious criticism was the dropping of the term "factor of safety."

MR. C. O. BOYSE (B.I.C. Cables) defended the omission of "factor of safety" and pointed out that in other fields of engineering design loads were not of the same arbitrary nature as in overhead lines. The new Regulations defined minimum conditions and designers must consider their suitability for particular lines. Cradle guards at Post Office crossings would probably continue to be desirable, but he hoped that the requirements of the Post Office and of the railways would in future be expressed more simply.

MR. R. E. HUTCHINGS (E.R.A.), dealing with the tensioning of line conductors, said that arbitrary limitation of the maximum stress on the conductor to 75 per cent was probably acceptable for copper and cadmium-copper, but for s.c.a. conductors a difficult problem was presented owing to creep properties. Work done by the E.R.A., but not yet published, indicated

that aluminium would sustain indefinitely a load of 56 per cent of its ultimate tensile strength. The proposed limitation to 75 per cent would seem to be not excessive, especially if pre-stressing was practised.

MR. H. WILLOT TAYLOR (Southern Board) suggested that with a single-pole line the draft Regulations would mean using at least one-third more (wood) poles, which seemed unnecessary in view of past experience. Something was lost, he thought, by not differentiating in some of the regulations between low- and high-voltage lines. He supported the suggestion that other standards should be prepared and pointed out that the B.E.A. had already appointed several committees for this purpose.

As to the term "factor of safety," a good deal depended on the meaning attached to it. If "a factor of safety of 2" meant that the design would carry without breaking twice the assumed maximum load, he agreed it could not apply to conductors; but if it meant that when carrying its assumed maximum load the stress did not exceed half the breaking load, it could apply. Instead of "factor of safety" it might be possible to speak of a "loading factor," so that "a loading factor of 50 per cent" would mean that the maximum working strength for which the line was designed would be 50 per cent of the breaking load. He deprecated any wholesale change in the Regulations at a time when supply engineers were so busy catching up with arrears of work.

MR. G. W. PRESTON (Copper Development Association) agreed that a tension of 75 per cent of the ultimate tensile strength was a sound one to adopt and much better than the 50 per cent taken hitherto. It must be borne in mind, he said, that the design engineer was concerned with the ultimate condition of failure and that the stress in an overhead line conductor was by no means directly proportional to the load which it carried. The ultimate stress would not be a satisfactory basis of design, because conductors would sustain serious damage before reaching the ultimate, and the modulus would not apply all the way to 100 per cent.

Undefined Terms

MR. W. HILL criticized the use of such vague terms as "adequate," "sufficient clearance," "adequate physical separation" and so on. Some guidance, if not definite instruction, should, in his view, be given. In Regulation 5, for instance, he thought that where two lines crossed it should be laid down that there must be a point of support on each fairly close to the crossing. Mid-span crossings were dangerous when ice loading occurred.

MR. B. DONKIN (Kennedy & Donkin) expressed the hope that an explanatory memorandum would be issued with the new Regulations, on the lines of that issued for El.C.53. Criticizing Regulation 6, dealing with minimum height, he pointed out that armoured vehicles traversed the countryside far from roads and similar vehicles were being developed for agricultural use.

MR. P. MCKENNA, in the course of a detailed criticism of many of the draft Regulations, pointed out the difficulty due to covering both high- and low-voltage lines in the same regulations. For instance, "Danger" notices had not so far been fixed to low-voltage poles. He suggested that BS.1320 should be amended to comply with the new Regulations. It had always been a weakness of transmission line work, he contended, that it did not accord with general engineering practice and something might be lost by dropping the general engineering term "factor of safety." Nor should sight be lost of its psychological value.

MR. B. L. METCALF welcomed what Sir John Kennedy had said about the nationalized industries taking part in the co-ordination of regulations and MR. W. J. NICHOLLS mentioned that the C.E.B., after at one time reducing the tension employed, had gone back to something like the previous higher tension, with vibration dampers.

Post Office Requirements

MR. P. B. FROST (Post Office) said that if BS.1320 was too elaborate in its provisions regarding crossings, that was not the fault of the Post Office, which set up a very simple standard. The hope had been expressed that guards over Post Office wires would not be wanted in future. An elaborate test had been carried out last July by dropping a 33 kV conductor on Post Office wires connected to all kinds of apparatus. The results varied very much with the duration of contact, but both the current and voltage had been limited by the conditions of the site, the voltage to 5,000 V to earth and the current to 700 A. If power undertakers could observe those conditions the Post Office might consider doing away with guards, but not where the source of power was almost unlimited.

MR. H. W. GRIMMITT, in reply, said the Regulations would not inhibit under-eaves construction, which he advocated. An explanatory memorandum would be issued with the Regulations. It was essential to avoid the over-complication of the American regulations. He doubted whether the Americans really understood their own regulations. The present form of the draft Regulations would require some amendment to cover low-voltage lines.

COMMERCE and INDUSTRY

Scottish Trade Fair : Reduction of Steel Subsidies

ELABORATE plans for holding a Scottish Industries Exhibition from 1st to 17th September next were outlined at a Press conference held in London last week. The exhibition, which is being held at the Kelvin Hall, Glasgow, has been organized under the auspices of the Scottish Council (Development and Industry). It will be the largest exhibition ever staged in Scotland and will cover every phase of Scottish industry. Its object is the promotion of Scottish export trade, and over eighty industries and trades will take part. Arrangements have been made to accommodate and cater for 60,000 visitors a day. Around the hall will be stands totalling over two miles in length, and there will be an arena of 25,000 sq ft for pageants and other displays, capable of seating 3,500 people. The architect is Mr. B. Spence, the creator of the "Britain Can Make It" display. The exhibition has met with ready response from Scottish industry and it is announced that the exhibiting space has already been fully booked.

Norwich E.D.A. Circle

At the dinner of the Norwich & District E.D.A. Circle on 30th March Mr. W. G. Cutbush, the Lord Mayor, in replying to the toast of "The City of Norwich," proposed by Mr. J. A. Sumner, said that he hoped that now the electricity undertaking was nationalized it would continue to give the same excellent service as it had done in the past. Mr. C. T. Melling, chairman of the Eastern Electricity Board, promised close co-operation between the Board and local electrical traders. Mr. V. W. Dale, general manager and secretary of E.D.A., said they were appealing to the Chancellor of the Exchequer to consider the removal of purchase tax on domestic appliances.

Time Switches for Australia

The Horstmann Gear Co., Ltd., has received a further contract for 10,000 type V synchronous time switches, in moulded outer cases, from the State Electricity Commission of Victoria, Australia. This contract, which, it is estimated, will mean about ten months' work for the department concerned, was secured by the company's co-agents, Johnson & Phillips, Ltd., and Lawrence & Hanson Electrical (Vic) Pty., Ltd., of Melbourne.

Lighting for Paper Manufacture

In the manufacture of high-grade papers, so important is the need to maintain a uniform high quality and finish that every sheet of paper is examined for flaws and creases before it is allowed to leave the factory. Good seeing conditions are therefore of paramount importance on such work. Alex, Pirie & Sons, Ltd., Hylton, Sunderland, have installed Metrovick fluorescent lighting consisting of sixty industrial trough reflectors with 5ft "daylight" fluorescent lamps. The illumination on the working plane is 25/30 lumens per sq ft.

Metrovick fluorescent lighting for high-grade paper inspection

Steel Subsidies Reduced

Mr. Strauss, Minister of Supply, stated in the House of Commons last week that the Government had been considering the subsidies at present being paid on iron and steel, and had come to the conclusion that the subsidies to meet the excess cost of imported finished steel and the import duties on pig iron and steel should be continued. But as from 1st April the remaining subsidies would cease with an estimated saving to the Exchequer for the year 1949/50 of about £25 million. The corresponding increase in cost to the industry would necessarily be reflected in higher prices for its products. The Iron and Steel Board had for some time been making a detailed review of the price structure of the industry and recommended that certain other price adjustments should be made at the same time.

The new maximum prices resulting from this review and the withdrawal of the subsidies were embodied in the Iron and Steel, and Bolt and Nut Control Orders which had just been laid. They were designed to provide no more than a reasonable return on capital employed to each section of the industry, and on the best calculations possible would give no increase but probably some reduction in the total profits of the iron and steel industry. He was circulating a list of the existing and new prices of representative products from which it would be seen that the increases varied from 10s 3d per ton for foundry pig iron to 89s per ton for tin plates, but for most of the products they were between £2 and £3 per ton. The Government appreciated that these increases would add to the task of some industries in maintaining competitive prices in the export markets, but the increases were small in relation to the costs of highly engineered products worth hundreds of pounds per ton of steel. These industries would, moreover, still obtain their steel, in the main, as cheaply as their principal overseas competitors.

275-kV Circuit breaker Goes to B.I.F

The largest exhibits are already beginning to arrive at the British Industries Fair. The accompanying photograph, taken near Dun-

A 275-kV B.T.H. circuit breaker en route for Castle Bromwich

church, on the London to Birmingham Road, shows the tank of a 275 kV oil circuit breaker on its journey from the British Thomson-Houston Company's Switchgear Works at Willesden to Castle Bromwich. The breaker, complete with bushings, is over 23ft high, the oil tank being over 10ft in diameter and 6ft deep, and is probably the largest single piece of electrical equipment ever to be shown at the Fair. It is designed for use in large outdoor switchgear installations.

Export Licensing Control

The President of the Board of Trade announced in the House of Commons on 31st March that he had made an Order, to become operative on 8th April, extending export licensing control over a wider range of goods of potential military value. Goods included are graphite, mica in certain forms, siloxanes, specified non-ferrous metals and alloys, high-speed compressors, diamond dies, diamond-tipped tools, certain metal-working machines and some scientific apparatus.

Contractors' Conference

The Electrical Contractors' Association is to hold its first post-war annual conference at Folkestone on 29th and 30th June and 1st July. On the first evening there will be a reception by the president, and on the following day a business meeting and a mayoral reception. After the annual general meeting on 1st July the rest of the day will be devoted to social events.

Batti-Wallahs' Society

Last week's luncheon of the Batti-Wallahs' Society was the first since the annual general meeting, and Col. H. J. Wellingham, outgoing president, inducted the new president, Mr. Forbes Jackson, into the chair. Mr. J. W. Woolley also handed over the duties of the "Mate" to Mr. A. H. Hughes.

The chief guest at the luncheon was Mr. F. J. Erroll, M.P., whose talk on "A Day in the Life of a Member of Parliament" not only gave an insight into Parliamentary procedure, but also dispelled any impression that the life of an M.P. is an easy one.

Packaging and Export Trade

The vital contribution which efficient packaging and first-class packing can make to the country's export trade was referred to by Mr. L. C. Gamage, vice-chairman and joint managing director of the General Electric Co., Ltd., and president of the Institute of Export, in an address before the Institute of Packaging last week. Mr. Gamage said that there were still people who believed that, because of our mounting export trade, there was no real use for the Institute. It had grown from a membership of 215 in 1946 to the present figure of 600, but it was still not getting the support it needed if it was going to become a live factor in the export drive. Competition overseas was mounting every day and we should have to sell our goods in an increas-

ingly critical market which would respond to those goods which, in addition to the highest quality in relation to price, the best appearance and finish, were attractively presented in their packaging and packing.

The institute should have constantly before it the necessity of efficient packaging and first-class packing to meet the needs of each particular market, the collection, by means of market research, of the needs of each overseas market, so that a specification could be laid down in each instance, make known what materials were available for packaging and packing, and to take up the cudgels on behalf of British industry with the Government and shipping companies in those instances where British industry was at a disadvantage *vis-à-vis* foreign competitors.

Cheaper Lead and Zinc

Following recent price decreases in the United States, the Ministry of Supply has reduced its selling prices of lead and zinc. As from 4th April, the prices per ton are as follows:—Good soft pig lead, £106; G.O.B. and prime Western zinc, £101; refined electrolytic zinc, £101 15s; zinc, not less than 99.99 per cent pure, £103 5s. The reductions amount to £17 per ton in the case of lead and £5 for zinc. The recent American price reductions amount to as much as £30 a ton.

Sign Manufacturers' Annual Meeting

The annual meeting of the Electrical Sign Manufacturers' Association was held at the Café Royal on 22nd March. The retiring chairman, Mr. J. F. Aldridge, submitted a report on the activities of the Association, the principal item of which was concerned with the campaign opened by the Association at the beginning of the year to bring about a relaxation of the ban on outdoor electrical signs. The chairman was able to report a successful result.

Employment in January

Statistics published in the March issue of the *Ministry of Labour Gazette* show that the numbers employed in the engineering, shipbuilding and electrical manufacturing industries in January last totalled 1,829,600 (1,460,000 males and 369,600 females). Detailed figures with comparisons for mid-1948 are given in the accompanying table.

Flexible Packaging Materials

The Council of Industrial Design is to hold an exhibition of flexible commercial packs and packaging materials in its exhibition hall, Murray House, Petty France, S.W.1, from 3rd to 31st May. The exhibition has been organized jointly by the Council, the Institute of Packaging, and the Printing, Packaging and Allied Trades' Research Association. Exhibits from over sixty firms will demonstrate some of the more interesting packaging in current use as well as many recent developments.

Trade Announcements

G. Curtis Holt, Ltd., have removed to larger premises at Circle House, Lady Lane, Leeds, 2 (telephone: Leeds 22243).

With reference to the announcement in our 18th March issue regarding the appointments of Mr. W. S. Porteous and Mr. A. J. Deas as representatives in Scotland of **E. K. Cole, Ltd.,** these appointments only apply to the radio products of the company, and no change is made in representation for Ekco-Ensign or "Thermovent" products. The agent in Scotland for "Thermovent" is Mr. J. Clegg, 59, Rotherwood Avenue, Glasgow.

The Wholesale Electric Co., Ltd., of London and Lewisham, announces that it has opened a branch, trade counter and stores at 111, The Brook, Chatham, under the management of Mr. A. W. Goulding (telephone: Chatham 4244/5).

Mr. W. A. Larmouth, electrical contractor, has removed to 264, Norton Road, Norton, Stockton-on-Tees.

Mr. T. Clapham has been appointed sales representative for the **Carlisle Electrical Manufacturing Co., Ltd.,** and will operate in Lancashire.

Industry	Thousands					
	Males		Females		Total	
	Mid-1948	Jan., 1949	Mid-1948	Jan., 1949	Mid-1948	Jan., 1949
Electrical Machinery	118.2	119.1	46.7	44.8	164.9	163.9
Electrical Wires and Cables	38.2	38.5	24.0	22.9	62.2	61.4
Telegraph and Telephone Apparatus	27.8	28.8	16.6	17.0	44.4	45.8
Wireless Apparatus (exc. valves) and Gramophones...	36.0	35.9	31.2	29.9	67.2	65.8
Wireless Valves and Electric Lamps	16.7	16.6	19.9	19.0	36.6	35.6
Batteries and Accumulators	10.7	11.3	8.6	9.4	19.3	20.7
Other Electrical Goods	68.1	68.4	51.4	49.8	119.5	118.2
Electric Wiring and Contracting	61.3	62.6	6.3	6.3	67.6	68.9
Electricity Supply	126.7	129.3	13.5	14.6	140.2	143.9

Poselco, Ltd., have removed from Birmingham to 39-40, Lancaster Mews, Hyde Park, London, W.2 (telephone: Ambassador 6414).

Dulrae, Ltd., announces that it has acquired the goodwill, patents, stock and other assets of the Dulrae Manufacturing Co., Ltd., and is continuing with the manufacture and application of Dulrae, Medrae and Hirae low, medium and high temperature radiant warming systems and appliances for space warming and industrial heating requirements. For the time being inquiries should be addressed to the temporary London area office at 10, Brockett Close, Welwyn Garden City, Herts (telephone: Welwyn Garden 442).

E.W.F. Reorganization

The Electrical Wholesalers' Federation announces that its constitution is being reorganized and simplified, and as a result the limited company registered in 1915 is being wound up voluntarily. The Federation, which is a certified trade union, will continue its activities as heretofore, but its assets will be held by a trustee, namely, a new company incorporated on 28th March, under the same name, for this specific purpose.

Telcon Magazine

The third issue of the Telcon House Magazine (Telegraph Construction and Maintenance Co., Ltd) contains an interesting contribution by Mr. P. L. Reid on the history of the company's premises in Old Broad Street, where it has now had an office for eighty-five years.

Fractional H.P. Motors

In the note under this heading in our 18th March issue (p. 458) it should have been mentioned that split phase as well as capacitor start machines are included in the "Chetah" range of silent-running fractional-h.p. motors made by Weldall & Assembly, Ltd., Berry Hill Factory, Droitwich, Worcs. When ventilated machines are supplied they are fitted with sleeve bearings; ball-bearing machines are normally for face and spigot mounting, although they can be arranged with solid foot mounting if required.

Travelling Exhibition

The Caroline Haslett Trust is inviting applications for a Travelling Exhibition in the early autumn, tenable in Holland. The successful applicant, who must possess the Diploma in Electrical Housecraft awarded by the Electrical Association for Women, will travel in Holland for one or two months to study home economics, particularly in the application of electricity to housecraft, and will acquaint herself with the publicity methods adopted there. She will visit works where domestic electrical equipment is manufactured and will hope to see, both in the home and out of it, the latest electrical developments.

Romac Silver Jubilee

Romac Industries, Ltd., has completed twenty-five years of existence, and to mark its silver jubilee a dance and cabaret were held on 28th March at Wembley Town Hall.

Change of Address

The headquarters of the South Wales Division of the British Electricity Authority now at Cardiff (Pengam Moors) Airport, Cardiff.

Change of Name

The General Electrical Radio Co., of 21-24, Shene Street, London, E.C.1, has changed its name to General Sonic Industries.

Catalogues and Lists

Diamond H Switches, Ltd., Gunnersbury Avenue, London, W.4. — Catalogue of switches and thermostats.

Pye, Ltd., Radio Works, Cambridge.—Folder on the "Dolphin" marine radiotelephone set for small craft.

Crypton Equipment, Ltd., Bridgwater, Somerset.—Descriptive folder on the CH 11 electrical test bench for garage use.

L. G. Hawkins & Co., Ltd., 30/35, Drury Lane, London, W.C.2.—Leaflet on the "Electric Hostess" sideboard model food warmer.

Steatite Insulations, Ltd., 25, Somerset Road, Edgbaston, Birmingham, 15.—Catalogue of ceramics for electrical purposes.

General Lighting Equipment Co., Ltd., 99, Great Eastern Street, London, E.C.2.—Catalogue, illustrated folder and price list of "Gleco" lighting fittings, lamp standards, etc.

Salford Electrical Instruments, Ltd., Silk Street, Salford, 3, Lancs.—Technical brochure on copper oxide instrument rectifiers.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C2.—Priced catalogue of torches, cycle lamps, hand lamps and batteries.

Bowthorpe Electric Co., Ltd., Tinsley Lane, Crawley, Sussex.—Folder (B.66) describing steelwork for overhead transmission lines.

George H. Scholes & Co., Ltd., Wylex Works, Wythenshawe, Manchester.—Two priced catalogues of domestic plugs, sockets and clock connectors.

Lighting Fittings

ASSOCIATION'S ANNUAL REPORT

HEAVY purchase tax, electricity supply restrictions, limitations on capital expenditure and continued high costs of production made the past year a difficult one for the members of the Electric Light Fittings Association. Much has been done, however, to offset these disadvantages by improving trading conditions, where possible, in the industry as a whole by eliminating waste in distribution costs.

The report for 1948 records the addition of two members, raising the total to 48 firms. There were 70 meetings within the Association during the year.

Statistics for the first three-quarters of the year (prepared by the Board of Trade from information supplied by the industry) show that home business in industrial fittings declined considerably, particularly fluorescent types. It was hoped that the seasonal rise in the last quarter would check this decline and that business would be further stimulated by the increase in building licences for factories from April onwards.

Sales of street lighting fittings and decorative and commercial fittings continued low, although there was a slight upward trend during the third quarter. There, again, it is hoped that the increase in building licences and the school-building programme will bring about improvement.

Close collaboration with kindred associations has continued and the help and co-operation of Government Departments is acknowledged.

In the Decorative and Commercial Fittings Section the introduction in May last of Orders fixing maximum prices and distribution margins for domestic and office type fittings has temporarily delayed full introduction of the reduced basic trade discount of 25 per cent and the revised trading code. It is hoped that continued collaboration with the Central Price Regulation Committee will soon result in a more satisfactory arrangement. Certain concessions in connection with delivery charges and more equitable margins for importers and wholesalers in imported illuminating glassware have already been made.

The Association welcomed the reduction in purchase tax last April, but thinks that there is a strong case for the total abandonment of the tax in view of the need for better lighting and for fuel saving.

Plans for a more comprehensive trading code for industrial fittings were further developed during the year and it was hoped to put them into operation early in 1949. Last year saw the full introduction of the comprehensive and detailed trading code for the Street Lighting Fittings Section; this is being kept under constant review for amendment to meet changing conditions.

Scottish Minerals

HYDRO BOARD'S INVESTIGATION

THE North of Scotland Hydro-Electric Board is carrying out an investigation into the development by the use of electricity of the raw materials of the Highlands. The survey programme fills a gap not covered by existing research organizations, and will involve a general examination of the resources of the Highlands in the hope that the application of new technical processes may lead to the commercial exploitation of undeveloped minerals and other raw materials and the establishment of new industries to provide employment for the people of the area. Minerals of widespread occurrence in the Highlands, such as limestones, dolomite, felspar, talc, serpentine, dunite, diatomite, clays, sands and gravels, etc., will receive attention. Mr. Robert H. S. Robertson, a Glasgow geologist and chemical engineer, who has been appointed consultant in raw material development, will supervise the investigation.

The Board has endowed a research scholarship at the Royal Technical College, Glasgow, where scientific research will be directed by Professor W. M. Cumming, O.B.E., Director of the School of Chemistry and Professor of Technical Chemistry. Technical research, chiefly concerned with the development of suitable electrical apparatus for processing, will be carried out in the Board's electrical research laboratory at Dundee.

A start has been made with experimental work to examine the de-watering of wet materials, such as peat and diatomite, by electrical methods. Investigations will be directed towards finding processes which will permit the finishing of products in the area, instead of involving transport of

materials to manufacturing centres in the South, and also towards developing processes which will supply products for which there is a demand in the North. Inquiries are also being made about the purification, separation and treatment of raw materials. This work will be extended to include a review of new electrical techniques in the kilning of limestone, the calcining of diatomite, the production of special types of bricks, the purification of water and the treatment of milk, and there will be discussions with industry concerning these developments.

Next Week's Events

Monday, 11th April

LONDON.—Savoy Place, W.C.2, 6 p.m. I.E.E. Education Discussion Circle. Discussion on "The Scheme for the Interchange of Information on Electrical Engineering Laboratory Practice." Opened by Dr. E. Bradshow. "Transient Display Apparatus." Opened by A. C. Normington.

At the Institution of Electrical Engineers, Savoy Place, W.C.2, 5 p.m. Institution of Post Office Electrical Engineers. "Wire Broadcasting," by F. Hollinghurst and W. Prickett.

NEWCASTLE-ON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. Annual general meeting. "Magnetic Transducers and their Use in Measurements," by H. M. S. Smith.

Tuesday, 12th April

BELFAST.—Queen's University, 6.45 p.m. I.E.E. Northern Ireland Centre. "A Standard Frequency and its Applications," by C. F. Booth and F. J. M. Laver.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. Informal lecture on "Radio-Frequency Heating," by Dr. R. H. Barfield.

Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6.30 p.m. Association of Supervising Electrical Engineers. "Nuclear Reactors as a Possible Power Source," by Dr. G. C. J. Dalton.

At the London School of Hygiene and Tropical Medicine, W.C.1, 6 p.m. Illuminating Engineering Society, 6 p.m. "The Manufacture of Lighting Glass," by J. G. Holmes, and "The Manufacture of Metal Parts of Lighting Fittings," by P. Hartill.

Storey's Gate, St. James's Park, S.W.1, 6 p.m. Institution of Mechanical Engineers. Discussion on "Fatigue Strength of Cast Crankshafts," by Dr. H. R. Mills and R. J. Love.

LUTON.—Assembly Room, Town Hall, 7.30 p.m. Luton Electrical Society. Annual general meeting. Paper "The Diesel Electric Locomotive (Passenger)."

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Supply Group. "Overhead Line Regulations," by H. W. Grimmitt.

Wednesday, 13th April

BIRMINGHAM.—Chamber of Commerce, 7 p.m. Association of Supervising Electrical Engineers, Birmingham Branch. "Mineral Insulated Copper Covered Cable," by G. Gilchrist.

EDINBURGH.—Heriot-Watt College, 7 p.m. I.E.E. Scottish Centre. Annual general meeting. Discussion on "Fundamental Principles of Electrical Engineering: How and When Should They Be Taught?" opened by Prof. M. G. Say.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Supply Section. "The Detection of Winding Failures during Impulse Tests on Transformers by Oscillographic Methods," by E. C. Rippon and G. H. Hickling.

NORTHAMPTON.—Northampton and District Electrical Association. "More Fundamentals of Electricity," by O. F. Bailey.

SHEFFIELD.—Royal Victoria Station Hotel, 4.30 p.m. I.E.E. Sheffield Sub-Centre. "The Influence of Inverse Time Relay Characteristics on Discriminative Time," by E. W. Connon and E. Smith. (Joint meeting with North Midland and North-Western Centres.)

Thursday, 14th April

PALMERS GREEN.—St. John's Hall, Hoppers Road, 8 p.m. A.S.E.E. North London Branch. "The History and Subsequent Development of Fluorescent Materials," by H. W. Windebank.

WORCESTER.—Talbot Hotel, 7.15 p.m. Worcester Electric Club. "Secondary Batteries and Their Modern Applications," by C. P. Lockton.

E.A.W. Conference

Programme for this Year's Function in London

THE twenty-fourth annual conference of the Electrical Association for Women is to be held this year at the Connaught Rooms, Gt. Queen Street, London, W.C.2, on Friday, 29th April.

The annual general meeting will be held in the morning and will be followed by a luncheon at which the speakers will be Mr. T. G. N. Haldane, president of the Institution of Electrical Engineers; Sir Henry Self, deputy chairman of the British Electricity Authority; the Countess of Albemarle, chairman of the National Federation of Women's Institutes; and Ald. Miss Kingsmill Jones, Lord Mayor of Manchester. The president of the E.A.W., the Dowager Lady Swaythling, will take the chair. For those not participating in the council meeting in the afternoon visits have been arranged to the Building Centre and "On Our Way" Britain's economic recovery exhibition. The golf competition for the Lady Hughman Challenge Bowl will be held on the previous day (Thursday, 28th April) at the Banstead Downs Golf Club.

Exports to Canada

OPPORTUNITIES FOR BRITISH MANUFACTURERS

IN February the Board of Trade published the report of the Engineering Mission led by Mr. E. H. (now Sir Harry) Gilpin which last year toured Canada to investigate the prospects for British manufacturers. The members of the Mission included Mr. D. Maxwell Buist, export director of the British Electrical and Allied Manufacturers' Association, whose own report prepared for members of the Association and of the Electrical Industry Export Groups has now been issued.

Electricity, Mr. Buist points out, is concerned in all the great projects on hand or under development in Canada to-day; oilfields near Edmonton; iron ore deposits in Labrador (for which a 400,000 h.p. hydro-electric scheme is under consideration); diesel-electrification of railways; Toronto underground railway scheme; 5,000,000 h.p. expansion of hydro resources and construction of supplementary steam plants, particularly in Ontario; 45,000 miles of overhead power lines, equal to half the existing mileage; expansion of rural electrification; and the vast programme of frequency standardization in Ontario, to cost £50 million over a period of 15 years.

Lack of Representation

There are thus excellent opportunities for U.K. manufacturers, although the Canadian market presents many difficulties. A lamentably small proportion of British electrical and allied manufacturers are represented in the Dominion, and Mr. Buist emphasizes the importance of this aspect as well as the need for effective publicity to compete with United States advertising. Criticisms of prices, delivery times and service were dealt with in the earlier official report. Whatever the level, a fixed price is generally preferred except in contracts for heavy capital equipment involving long delivery periods, when an "escalator" clause is usually acceptable, preferably with a "ceiling." The United States and Canadian clauses are similar to the contract price adjustment clause of British electrical manufacturers.

Regarding the Ontario frequency conversion scheme, it is suggested that U.K. manufacturers should set up some organization for dealing expeditiously with inquiries, and the author of the report recommends the appointment of a qualified engineer in Toronto to work in close collaboration with British manufacturers.

The opinion is expressed that the importance which hydro-electric power is assuming in various territories merits consideration being given to the establishment of a world hydro-electric power convention or conference.

The question of expense and delay entailed in sending equipment to Toronto for testing was discussed with officers of the Canadian Standards Association, who expressed willingness to consider some scheme whereby qualified persons would be appointed to carry out the tests in U.K. factories. This matter is to be taken up with the British Standards Institution.

A number of useful appendices show the production of electrical equipment in Canada, imports and duties on selected items, together with lists of trade commissioners, official publications, periodicals, etc.

From the table of electrical imports it is seen that the total has risen from £3,139,000 in 1937 to £17,065,000 in 1947, the bulk coming from the United States (93.6 per cent in 1947). The U.K. share fell from 12.8 per cent in 1937 to 3.4 per cent in 1944, recovering to 5.5 per cent in 1947. The actual value of imports from this country has, however, rather more than doubled in the decade (£930,000 in 1947 compared with £403,000 in 1937).

I.E.E. Benevolent Funds

AS a result of the nationalization of the electricity supply industry, the employers' sides of the National and the North-Western District Councils have been dissolved and various funds which were standing to the credit of these bodies have been presented to the Benevolent and Homes Funds of the Institution of Electrical Engineers. Cheques have been received through Alderman Sir William Walker and details of the organizations and amounts subscribed are given below:—

The employers' side in each case of the National Joint Industrial Council for the Electricity Supply Industry (manual workers), £518; the National Joint Board, E.S.I. (technical staff), £280; District Council No. 3 (North-Western Area), £332; District Board No. 3 (North-Western Area), £184; National Joint Committee of Local Authorities and Chief Electrical Engineers, £65.

The Court of Governors record their deep appreciation to the members of these bodies for voting these sums in equal measure to the two funds.

Transport in Glasgow

ESTABLISHMENT of a rapid transit system in Glasgow on the lines of London's underground railway was advocated by Mr. E. R. L. Fitzpayne, general manager of the Corporation Transport Department, when he addressed the Scottish Section of the Institute of Transport in Edinburgh on 25th March. The population which would be served by such a system would be approximately 2,000,000, which would, he said, fully justify the expense. It was sometimes argued that no British city outside London could afford a rapid transit system; but part of the present Boston system had been completed in 1898 when the population was only 400,000, and the population of Philadelphia in 1907 was 1,450,000 when their first rapid-transit line was completed. Mr. Fitzpayne considered that there was no virtue in constructing the Glasgow system underground unless it was absolutely necessary. What was required was that the electric cars should be undisturbed on their own tracks, and this could be accomplished on the surface as well as in subways. There were, he said, many important public works waiting their turn in the queue for finance, but this proposition affected the lives of so many that it should be high in the priority list.

Street Lighting Improvements

WALLASEY is overhauling its system of street lighting. The first stage in the comprehensive scheme of improvements has just been completed by the switch-on of the initial section of sodium lighting and the introduction of the "Rythmatic" control system.

Stage I of the conversion scheme, just over one mile in length, includes 57 new reinforced concrete standards carrying 140-W sodium lanterns suspended at a height of 25ft. This equipment supersedes the gas lighting. Stage II, now in progress, provides for changing over a further length of 2¾ miles.

The improvements planned include three different types of main road lighting, namely, sodium discharge lamps (9.1 miles), mercury vapour lamps (6.1 miles), and tungsten lamps (10.7 miles). These groups have been so arranged that each main through route to New Brighton retains the same type of illumination; thus any visitor, by following a particular lighting scheme, can find his way to the promenade.

The Mayor of Wallasey inaugurated the new "Rythmatic" control system at a ceremony in the Seaview Road substation of the Merseyside and North Wales Electricity Board on 30th March in the presence of a large number of guests.

Boston Council proposes to replace gas street lamps with electric lamps.

Hyde Town Council has received approval to borrow £8,000 for the provision of 104 new lighting points along main roads.

Meriden R.D.C. proposes the electric lighting of all roads and lanes in Meriden in accordance with normal village lighting standards, except the Coventry-Birmingham trunk road (Group A standard). The cost is expected to be in the region of £10,000.

Southampton Works Committee has recommended that the borough engineer should be authorized to carry out an experiment with different types of sodium and mercury lanterns in Bullar Road.

The surveyor to Bromsgrove Council has prepared a scheme for improved lighting in roads leading to the main trunk road with mercury vapour lamps on concrete columns, estimated to cost £1,602. He has also been asked to submit a scheme for Claypit Lane, Catshill, from the main road to the cross roads.

Wallsend Town Council's plans to spend £2,378 on providing 98 electric street lighting standards on new housing estates have been approved by the regional officer of the Ministry.

Leigh Corporation has received sanction to borrow £3,233 for new mercury lighting in Firs Lane and Plank Lane in place of gas lighting.

A preliminary scheme for public lighting by electricity in a number of main roads at Urmston is being submitted to the Ministry of Transport.

The North Wales Electricity Board is preparing a scheme for the electrification of street lighting in Beaumaris.

Eire's Plant Programme

IN the Dail recently Mr. Morrisey gave the following dates for the inauguration of the plant extensions now in hand: Leixlip (Liffey), 1949; Portarlington No. 1, autumn, 1949; Cliff No. 1 (Erne), summer, 1950; Portarlington No. 2, spring, 1950; Cathaleen's Falls No. 1 (Erne), winter, 1951; Cathaleen's Falls No. 2, spring, 1952; Allenwood, Nos. 1 and 2, spring, 1952; Ringsend, Dublin, late in 1953; and Lee (County Cork), summer, 1954. The E.S.B estimated that by 1955 the output would be about 1,300 million kWh, compared with the present output of about 620 million.

Electricity Supply

South Wales Area Transfer : I.O.M. Controversy

CERTAIN parts of South Wales which have been included in the area of the Midlands Electricity Board are transferred to the South Wales Board by the Electricity (South Wales) (Transfer) Order, 1949 (S.I. 1949, No. 569, H.M. Stationery Office, price 1d). This affects the electricity undertakings provided for by the following orders:— Brecon Electricity Special Order, 1926; West Gloucestershire Electricity (Extension) Special Order, 1928, as amended by the West Usk (Extension) Electricity Special Order, 1934, in so far as they apply to Monmouthshire; Abergavenny and District Electricity Special Order, 1939; and Radnorshire and Brecknockshire Electricity Special Order, 1932. These undertakings lie entirely in the South Wales Area, but came under companies whose other undertakings were in the Midlands Area.

Success of Load Spreading

At a meeting of the Cumberland and Westmorland District of the Northern Regional Board for Industry at Workington it was reported that the winter electricity load-spreading scheme for the area had effected a 26.5 per cent transfer of the industrial load and a 20 per cent transfer of commercial consumption. The target was 20 per cent in each case. The vice-chairman, Mr. F. J. Tinn, said that the figures reflected the excellent co-operation of industrial and commercial consumers in their efforts to safeguard the electricity supply. Although the position had been helped by the mild winter, there was no doubt that load spreading had been an important factor.

Electricity Output

The Ministry of Fuel and Power statement for the week ended 25th March shows that 856.6 million kWh was sent out for public supply from solid-fuel-fired stations, as compared with 967.0 million kWh in the preceding week, and 759.0 million for the week ended 27th March, 1948. Stocks of coal at electricity undertakings at 26th March totalled 3,281,400 tons.

Towards Universal Tariff

Whitworth U.D.C. has enquired from the North Western Electricity Board if and when a universal tariff might be expected. The reply indicated that the removal of anomalies presented by the different tariffs of former undertakings would be done by progressive stages. It was claimed that something had already been done towards standardization. The problem was not purely an Area one as an attempt was being made to agree on standard forms of tariffs throughout the country.

Canadian Production

Power production by Canada's central electric stations was slightly lower in 1948 than in 1947 because of a large decline in the province of Quebec, the Dominion's greatest hydro-electric producer. Lack of rain in summer and early autumn caused the decrease. Aggregate output for the year was 44,569 million kWh, compared with 44,986 million in 1947. Consumption of primary power rose from 37,375 million to 40,607 million kWh.

Provincial outputs in million kWh (1947 comparison in parenthesis) were as follows: Quebec, 24,646 (28,851); Ontario, 11,679 (11,540); British Columbia, 3,398 (2,991); Alberta, 718 (636); Saskatchewan, 789 (749); Manitoba, 2,053 (2,019); New Brunswick, 590 (575); Nova Scotia, 677 (610); and Prince Edward Island, 17 (15).

During the year stations reporting to the Bureau, which produce about 98 per cent of the total output, added more than 433,000 h.p. to the hydraulic plant and 40,000 h.p. to thermal capacity.

Londonderry Extensions

A conference was recently held between representatives of the Northern Ireland Joint Electricity Committee and Londonderry Corporation regarding the Corporation's plan for the extension of its generating station at a cost of £135,000. The Committee has agreed that there is no alternative to a limited extension and recommends that load conditions in the city and contiguous areas should later be studied so that it can be seen whether or not a major station should be built at Londonderry.

Manx Dispute

There are two distributing authorities in the Isle of Man: Douglas Corporation and the Isle of Man Electricity Board. The Corporation, from its power station at Pulrose, supplies electricity in bulk to the Board for distribution throughout the island outside Douglas. For some time there has been disagreement on various matters and at the last sitting of the island's Parliament, the Tynwald Court, the Board sought approval for setting up its own generating plant, at an estimated cost of £212,000. Mr. J. R. Corrin, chairman of the Board, said it had

been found impossible to come to an agreement with Douglas Corporation. The Board had obtained a quotation for a diesel station, and estimated that by this means they could save £25,000 a year. That would enable them to dispense with the present 10 per cent surcharge on consumers' accounts and to set aside considerable sums for development. Furthermore, the island would no longer be dependent on one generating station. Opponents of the scheme pointed out that Douglas Corporation was contemplating an expenditure of several hundred thousand pounds on extensions. The Tynwald Court gave its approval to the scheme, but the final word rests with the Lieutenant Governor. Some further attempts may be made at negotiation, possibly with a view to unified control, before the matter is finally decided.

Scientific Instruments

PHYSICAL SOCIETY EXHIBITION

ALTHOUGH structural alterations at the Imperial College, South Kensington, have interfered with the usual layout, this week's display of instruments and associated apparatus arranged by the Physical Society is of much the same size as last season's when about 13,000 visitors attended.

This is the fourth post-war exhibition and the thirty-third of the annual series organized by the Physical Society primarily for the purpose of indicating advances in design. The variety and width of range of products shown by manufacturers, with the demonstrations of research organizations and the universities, illustrate the rapidly increasing application of physical principles to the needs of industry. The greater number of the 117 exhibitors in the trade section are electrical.

Competition for Apprentices

The two dozen research and educational establishment exhibits are not this time separately grouped. After lapsing during the war years, the Craftsmanship and Draughtsmanship Competition has been revived. A panel of judges awards prizes and certificates in recognition of ability and to encourage skill among apprentices and learners within the instrument-making industry.

In one of the three customary discourses Mr. A. J. Philpot (British Scientific Instrument Research Association) explained why the laboratory has ceased to be the exclusive domain of the precision instrument, which has spread into factories and workshops, its users no longer being a specialist class. The quick growth of the new branch called electronics has given the instrument maker a valuable aid in the fulfilment of his purpose.

Mr. J. A. Ratcliffe (Cavendish Laboratory, Cambridge) spoke about wave-diffraction in the ionosphere, making analogies with optical phenomena. He showed fading to be caused by movements of random irregularities in the ionosphere and to be related to their turbulent or regular motions, thus enabling winds in the ionosphere to be measured.

Prof. O. R. Frisch (Cavendish Laboratory) reviewed methods and instruments employed for measuring the energy of particles emitted from atomic nuclei and discussed their relative merits.

The "Teleidoscope"

A film illustrated the mode of action of the "Teleidoscope," a recent cinema television development (under the late Prof. J. Fischer in Zurich) in picture reproduction by electro-capillarity. A modulated cathode-ray beam scans a raster upon a uniform liquid layer (eidophor) spread upon a revolving glass disc. Each point of the raster functions as a lenslet whose curvature depends upon the instantaneous electrical charge imparted by the scanning beam to the corresponding area of the liquid, a Töpler schlieren system effecting final resolution into a visible image.

The light output of this "light wave" is independent of the energy of the scanning beam and, furthermore, the degree of picture storage can be varied by adjusting the rate of leakage of the charges on the eidophor without sensibly changing the raster for the duration of each frame, which is then electrically "wiped out" by the conductivity of the eidophor.

FINANCIAL SECTION

Company News
Stock Exchange Activities

Reports and Dividends

The English Electric Co., Ltd., held its annual meeting on 30th March, when Sir George Nelson (chairman) who presided, after reviewing the report and accounts for the year said that the policy of the board for many years had been to broaden the basis of their business and the range of their manufactures and so to increase the stability of the company and help them to provide steady employment for staff and workpeople; this had resulted in the turnover of the company to-day reaching a level in money of ten times greater than it was in 1932. To achieve this, the number of employees had, in the same period, risen from 4,000 to approximately 25,000, to which at the same time had been added 10,000 employed by their subsidiaries, making a total of 35,000 who were manufacturing plant and equipment for use on land, at sea and in the air all over the world. The group's manufactures covered electrical apparatus from the smallest size up to the great 100,000 h.p. water-power or steam turbine generating sets, and included also electric locomotives, aeroplanes, wireless communication and navigational aid equipment, aero and marine engines, the whole covering an enormous field in science, engineering and production. Sir George then reviewed the manifold activities of the company and its subsidiaries D. Napier & Son, Ltd., Marconi's Wireless Telegraph Co., Ltd., and the Marconi International Marine Co., Ltd.

Referring to the company's research facilities he said that these were unsurpassed in the country and covered an extremely wide field of engineering within one organization. They had a number of the most advanced research laboratories investigating all types of prime movers, and had also large isolated laboratories dealing with research in nuclear physics; these had already resulted in their supplying equipment for research at universities and in laboratories engaged in the medical fields, including cancer research.

The extensions to their manufacturing facilities were now at last practically complete but only about 77 per cent of the total capacity was in use, owing to shortage of labour. They still needed an additional 5,000 people at their various works. The change-over from war activities was a gigantic undertaking, and it had not been possible to reach pre-war standards of productive efficiency as quickly as they had hoped. Progress, however, had been continuous and they were now on their way to their pre-war standards.

They had an uncompleted order book still the highest ever. Last year they increased their turnover by £5 million. Export business was practically 50 per cent of their production, and they were making a substantial contribution to the balance of payments, both in sterling and dollar areas. Their policy was to spread their orders over many countries so as to avoid any serious repercussions on their policy of stabilization of employment, should political or economic difficulties arise in any particular country.

Sir George concluded with a reference to national recovery. He said that one of our greatest problems now arose from the heavy scale of income tax, both on an industrial company, its employees and especially its senior executives. Means must be found to reduce taxation, otherwise it would become a cancer in our nation.

Marconi's Wireless Telegraph Co., Ltd.—Presiding at the annual meeting held on 30th March, Sir George Nelson (chairman) said that 1948 marked a further advance in the value of orders received from overseas territories. Many Government and international traffic concerns had ordered new Marconi communications equipment during the year, including the new v.h.f. multiplex radio linking equipment. Of the total orders received during 1948 60 per cent were for export, whilst if they included indirect exports such as aircraft and marine equipments, the percentage was 85. Arrangements had been made during the year for the selling of their marine equipments overseas to be handled by their associate, the Marconi International Marine Communication Co., Ltd. They had again allocated large sums to research.

Work on the important orders received from the B.B.C. for television transmitters was proceeding, and they were now developing and manufacturing entirely within their own laboratories and factories, cameras, pick-up tubes, monitoring and control apparatus, sound and vision transmitters and aerials. Following the interruption of the war period, they were once more playing a leading part in the provision of aviation apparatus. Their subsidiary, Marconi Instruments, Ltd., had entered the X-ray field and the first equipments had already been installed in hospitals. They were playing their full part in the applications of elec-

tronics. During the year, extensive alterations had been made at the main production establishments.

The Marconi International Marine Communication Co., Ltd.—In his review of the past year, Sir George Nelson said that since the end of the war they had been engaged in making up for lost time in the development of up-to-date marine communications and navigational equipment. The delivery of new apparatus from the works commenced in 1948, and during the year they were working under great pressure on a programme of installation of these new equipments, and this would continue during 1949. The main categories of shipboard apparatus were communication equipment, navigational aid equipment and sound reproduction equipment. Their associated companies abroad were making good progress with their post-war programmes. The Italian Marine Co., in which they had a majority holding, and which suffered severe losses of equipment during the war, had now turned the corner and made a small profit during the year. Arrangements had been made with Marconi's Wireless Telegraph Co. to be their sole exporter of marine equipments, and sales to associated companies abroad were showing an encouraging trend. Steps were being taken to have suitable apparatus available to meet the requirements of marine telephone sets, auto alarms, direction finding apparatus and echo-sounding equipment as recommended at last year's "Safety of Life at Sea" conference.

The Jerusalem Electric & Public Service Corporation, Ltd.—At the adjourned annual meeting held on 30th March, Mr. W. Shearer (chairman) said that during the year under review they sold 23.1 million kWh as compared with 19 million in the preceding year, but the resulting increase in revenue was more than offset by increased costs. As regards the current year, the corporation was operating on a very reduced scale as the hostilities involved a severance of their concession area, and they had been faced with great increases in costs. Tariffs had been increased, but even their present level was barely sufficient to enable them to meet the increased costs and the result was that for the fiscal year just ending they would be fortunate if they could cover their expenses.

International Combustion, Ltd., reports a consolidated trading profit for the year to 30th September last of £435,467, as compared with £225,189 for the preceding year, and after adding other income £464,243 is available. The net profit is £184,125 (against £89,778), less profits retained in subsidiaries, £2,579, leaving the net profit dealt with in the parent company of £181,137, to which is added £124,958 brought in, plus additional profit on contracts executed in previous years (£116,678), making £422,973. The ordinary dividend for the year is maintained at 37½ per cent, general reserve receives £250,000 and £95,486 is carried forward.

The company is making new issues of capital in Australia and South Africa to finance the construction of works which will relieve pressure on the Derby works. In Sydney 200,000 5 per cent preference shares will be issued and in Johannesburg 150,000 5½ per cent £1 preference shares. The South African issue will be priced at 23s.

The Telephone & General Trust, Ltd., has announced a final dividend of 5 per cent, making 8 per cent for the year (same), and a dividend of 8 per cent (same) on the "A" ordinary. The net profit for 1948, subject to tax, is £142,024, as compared with £137,705 for 1947. After placing £40,000 to revenue reserve, a balance of £103,505 is carried forward (against £118,794 brought in).

Heenan & Froude, Ltd., are offering to preference and ordinary shareholders, subject to the necessary resolution being passed, 200,000 4½ per cent £1 cumulative redeemable preference shares at par. The proceeds, estimated at £190,000, will provide additional working capital. Holders of the new shares will be entitled to convert on any 30th November to 1952 into ordinary shares at the rate of five for four preference.

In the circular to shareholders, the directors also announce a conditional agreement for the purchase of the whole of the share capital consisting of 200,000 £1 shares of the Morton Machine Co. (bakery and confectionery machine manufacturers) for 400,000 5s shares at 10s and £33,500 in cash.

Electric & Musical Industries, Ltd.—An extraordinary meeting was held on 1st April at which resolutions were passed adopting new articles, altering borrowing powers, and for the conversion of existing unissued ordinary capital into 1,000,000 4½ per cent cumulative redeemable preference shares. An issue of 460,000 of the new preference will be made with an offer of conversion to holders of the £460,000 6 per cent preference stock, which will be redeemed on 15th July.

Joseph Lucas, Ltd., are again paying an interim dividend of 5 per cent.

McMichael Radio, Ltd., are paying a dividend for the year of 8 per cent (unchanged).

Waygood-Otis, Ltd., are paying a final dividend of 5 per cent on the ordinary shares, making 25 per cent for the year. In the previous year the interim of 17 per cent was the only payment for the year, but the total dividend for 1946 was 20 per cent.

The British Electric Resistance Co., Ltd., has announced an unchanged interim dividend of 5 per cent.

J. & F. Stone Lighting & Radio, Ltd., are again paying an interim dividend of 10 per cent.

New Companies

Link Sound & Vision Services, Ltd.—Registered 25th March. Capital £100,000. Manufacturers, importers and exports of and dealers in equipment associated with the system of distribution and redistribution of sound broadcast and television, etc. Directors: E. J. Power (managing director, Murphy Radio, Ltd.); F. B. Duncan (director, Murphy Radio, Ltd.); C. O. Stanley (managing director, Pye, Ltd.); and N. A. Twemlow (general sales manager, Pye, Ltd.). Regd. office: 62, Brook Street, W.1.

Venner Accumulators, Ltd.—Registered 25th March. Capital £1,000. Manufacturers, importers, exporters and repairers of and dealers in electric accumulators, batteries, acids and dynamos, electric and automatic switches, electric clocks, etc. Directors: A. A. Rowse, J. M. Brooke, W. H. Lawson, and L. C. Sharp, all directors of Venner Time Switches, Ltd. Regd. office: Kingston By-Pass, New Malden.

W. R. (Holdings), Ltd.—Registered 22nd March. Capital £100. Receiving and relaying wireless broadcast or television programmes, etc. Directors: R. G. Turner and Wm. T. C. Smeathers. Regd. office: 17, Market Square, Northampton.

Bankruptcies

C. S. Lewis, 347, Eastern Avenue, Ilford, Essex, electrical contractor and retailer.—Receiving order made 29th March on debtor's own petition.

W. M. Horsfall, Heath Lodge, Hooton, Ches, carrying on business at 7, Redcross Street, Liverpool, electrical engineer.—Last day for receiving proofs for dividend 15th April. Trustee, Mr. A. A. Walter, West Africa House, 25, Water Street, Liverpool.

R. V. Mayner, 62, Harris Street, Peterborough, electrical engineer, lately carrying on business at Narrow Street and Wentworth Street, Peterborough.—Supplemental dividend of 17s 8¾d in the £, payable 20th April at the Official Receiver's office, 41, Sidney Street, Cambridge.

R. L. Newell, trading as R. & L. Newell, High Bank Mill, Egremont, Cumberland, electrical engineer.—First and final dividend of 8d in the £, payable 9th April at the Official Receiver's office, 14, Lowther Street, Carlisle.

F. W. Bedingfield, residing at 1, Victoria Road, Folkestone, and carrying on business at 49, High Street, Folkestone, radio and electrical engineer.—Trustee, Mr. A. M. Lander, 1, The Parade, Canterbury, Official Receiver, released 24th March, 1949.

D. J. Hope, residing and carrying on business at 6, Sunnyside Road, Wyke Regis, Weymouth, Dorset, radio and electrical engineer.—Trustee, Mr. A. L. Metcalf, 52, Fisherton Street, Salisbury, Official Receiver, released 24th March, 1949.

D. H. Mannion, residing at 129, Blackburn Road, Haslingden, Lancs, electrician, and carrying on business under the style of D. H. Mannion & Son, at 9, Regent Street, Haslingden.—First and final dividend of 2s 4¾d in the £, payable 19th April at the Official Receiver's office, 20, Byrom Street, Manchester, 3.

J. Green, Radio and Electrical Service, Maurice Road, Canvey Island, Essex.—First and final dividend of 20s in the £, payable 11th April at the Official Receiver's office, 20, Eaton Place, S.W.1.

Liquidations

Eastwood Electrical Co. (Keighley), Ltd.—Particulars of claims by 20th April to the liquidator, Mr. A. F. Trigg, 7, Bow Street, Keighley. Meeting of members on 29th April at Arcade Chambers, Keighley, to receive an account of the winding-up by the liquidator.

Lissen, Ltd.—Members' voluntary liquidation. Meeting of members on 2nd May (in place of 18th April previously advertised), at 1, Bowman's Place, London, N.7, to receive an account of the winding-up by the liquidator, Mr. C. E. M. Emmerson.

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Hatton" electric egg whisks.
"Lex" tube jointing compound.
"Vestray" window light reflectors.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

STOCKS and SHARES

THE Budget will have come and gone before this issue of the *Electrical Review* appears, and writing in advance, it is obviously impossible to say how Stock Exchange markets will be affected by its provisions. Beforehand, however, markets developed a firmness of tone which surprised a good many people who had been expecting continuance of the previous depression until, at all events, the Chancellor of the Exchequer had opened his Budget. The fact remained, however, that part of the earlier fall was recovered, and from being a depressed area, the Stock Exchange took on an appearance more in keeping with the vernal season of the year.

Week's Price Changes

Once more the falls, on the week, are considerably more than the rises, but few of the fluctuations this time are of any great consequence. A gain of 40 points lifted British Electric Traction deferred to 1875, from which it reacted to 1845. De la Rue shares are 3s up, at 37s 6d, Deccas hardened to 17s, Crompton Parkinson to 25s, Mather & Platt to 50s. Small falls made General Electrics 85s 6d, Johnson & Phillips 71s 6d, Switchgear & Cowans 14s. Telegraph Constructions are down half a crown at 45s. 9d. Arons are similarly easier at 42s 6d. Tube Investments, 6$\frac{1}{16}$, and British Thermostat, 26s 3d, have lost 1s 3d. Lancashire Dynamo at 5$\frac{1}{8}$ are ex dividend.

English Electric Meeting

Sir George Nelson showed at last week's annual meeting that the amount required to pay English Electric's 10 per cent ordinary dividend represented only 1.05 per cent of the group's turnover. He compared this with the 39 per cent taken by the cost of materials, and, roughly, the same proportion by wages, salaries and bonuses. Among the many points of general interest in the chairman's review is the indication that the year's eminently successful results were achieved with the group working below capacity. Owing to shortage of labour, only 77 per cent of the manufacturing facilities is in use.

Earnings and Shareholdings

Consolidated earnings of the English Electric group are calculated to represent approximately 27 per cent on the parent's £3,539,000 ordinary capital. From the investment point of view, the shares are backed by a conservative dividend, impressive resources and the company's firmly established position in most branches of an essential and developing industry. These qualifications are duly recognized in a yield of under 4$\frac{1}{2}$ per cent at the present quotation of 45s, and account for the widespread popularity of the shares. The chairman mentioned that 10,000 of the ordinary stockholders hold amounts of £250 or less.

E.M.I. Prospects

Approval was given, at last week's extraordinary meeting, to Electric & Musical Industries' capital proposals, one result of which is to be the issue of £460,000 4$\frac{1}{2}$ per cent preference shares. As previously notified, holders of the existing 6 per cent issue will be offered conversion into the new shares. Sir Alexander Aitken took the opportunity to give shareholders a report on the course of business. He indicated that profit margins, rather than the volume of sales, are reflecting the ending of the sellers' market, and that the effects will be apparent in the present year's accounts. The 10s shares are 1s higher at 19s.

Pye and Murphy

Reports of a new joint enterprise by the Pye and Murphy companies have helped to keep interest stirring in the shares concerned with television. Enquiry is also said to be stimulated by a widening range of cheaper sets in the shops, and by roof-top evidence that they are entering more homes.

Link Sound & Vision Services is the name of the enterprise formed by these two companies to investigate the possibilities of radio and television relay. Pye's 5s deferred shares are well supported at 27s 6d, yielding just over 4$\frac{1}{2}$ per cent. This is five shillings more than the return on E.M.I. shares at 19s. Murphy's shares are not quoted. At 5s, the 2s shares of Radio & Television Trust, which decided last year to terminate the radio side of the business, yield 10 per cent. This is also the return on McMichaels at 4s. Scophony are quoted at 3s. Cossors at 7s 3d remain depressed by the passing of the preference dividend. Plessey at 16s 3d are down 1s on the week.

Investor's Opportunity

To what is called the institutional investor—the insurance company, the trust and investment corporation, and others of this type—the recent fall in prices was a welcome development, in that it enabled investment of their constant accumulation of funds to be made on such terms as will provide a decent return on the money. The private investor will probably retort that current taxation prevents his saving any money. At the same time, he is ready to admit that if and when he has cash to spare, to-day's level of prices does give him at least a fair chance of obtaining a reasonable yield on sound security.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

14419. British Thomson-Houston Co., Ltd.—Excitation control of dynamo-electric machines. 28th July, 1943. (619848.)

15667. Farnsworth Television & Radio Corporation.—Panoramic radio receivers. 25th February, 1943. (619760.)

18739. British Thomson-Houston Co., Ltd.—Radiant thermal energy detectors. 30th September, 1943. (619942.)

20730. British Thomson-Houston Co., Ltd., and Maggs, A. H.—Dynamo-electric machines. 25th October, 1944. (620118.)

20731. British Thomson-Houston Co., Ltd., and Maggs, A. H.—Dynamo-electric machines. 25th October, 1944. (620119.)

21362. British Thomson-Houston Co., Ltd.—Double-throw automatic electric circuit-breakers. 1st November, 1943. (620027.)

23856. British Thomson-Houston Co., Ltd.—Fluid-actuated switches. 29th November, 1943. (619943.)

23857. British Thomson-Houston Co., Ltd.—Fluid-actuated operating mechanisms for electric circuit-breakers. 29th November, 1943. (619944.)

25140. British Thomson-Houston Co., Ltd., and Whiteley, A. L.—Electric control systems. 14th December, 1944. (620028.)

1945

19781. General Electric Co., Ltd., and Jacoby, H. C. E.—Circuits for controlling d.c. motors. 1st August, 1945. (619852.)

20504. Scophony, Ltd.—Means for producing light of variable colour for use, for example, in colour television receiving apparatus. 26th August, 1944. (620032.)

26069. McGee, J. D.—Electron-discharge devices. 6th October, 1945. (620033.)

29780. Murex Welding Processes, Ltd., and Rollason, E. C.—Manufacture of flux-coated welding electrodes and alloy compositions suitable for use therein. 8th November, 1945. (619763.)

29796. Soc. Anon. de Télécommunications.—Means for noise suppression in thermionic valve amplifiers. 1st December, 1942. (620128.)

32463. Landis & Gyr Soc. Anon.—Electro-magnetic relay chiefly designed for recording electric surges. 30th November, 1944. (619765.)

33964. Marconi's Wireless Telegraph Co., Ltd., and Stokes, V. O.—Automatic tuning systems. 14th December, 1945. (620131.)

34334. Marconi's Wireless Telegraph Co., Ltd.—Selecting mechanism for printing telegraph receivers. 30th June, 1944. (619859.)

34581. British Thomson-Houston Co., Ltd.—Electronic-discharge devices. 29th December, 1944. (619767.)

34979. Farnsworth Television & Radio Corporation.—Television colour-mixing system. 29th December, 1944. (620132.)

1946

1952. Bendix Aviation Corporation.—Electrical voltage regulator. 23rd January, 1945. (619955.)

3844. Mallory & Co., Inc., P. R.—High-voltage transformers. 7th February, 1945. (619956.)

4055.—Marconi's Wireless Telegraph Co., Ltd.—Phase detectors suitable for use in automatic tuning control arrangements and for like purposes. 9th February, 1945. (619864.)

4241. MacPhail, A.—Apparatus for electric therapy. 11th February, 1946. (619865.)

4705. Triggs, W. W. (Farnsworth Television & Radio Corporation).—Rectifier circuit frequency multiplier. 14th February, 1946. (619957.)

5508. Scophony, Ltd.—Colour television receiving apparatus. 1st March, 1945. (620137.)

5781. Submarine Signal Co.—Radio transmitters. 30th April, 1941. (Cognate application 5782/46.) (619958.)

6445. Standard Telephones & Cables, Ltd.—Directive antenna systems. 2nd March, 1945. (Cognate application 6446/46.) (619959.)

8658. British Thomson-Houston Co., Ltd., and Owen, C. E.—D.c. amplifiers. 20th March, 1946. (620140.)

8834/5. Hivac, Ltd., and Diggle, H.—Thermionic valves. 21st March, 1946. (619770/1.)

11272. Eureka Williams Corporation.—Electric motors. 12th May, 1945. (620143.)

11481. General Electric Co., Ltd., and Espley, D. C.—Signal transmission systems employing radio links. 15th April, 1946. (619772.)

11673. Standard Telephones & Cables, Ltd., Barnard, R. M., and Tomlin, A. W.—Drying films of material on metal. 16th April, 1946. (620041.)

11713. Sperry Gyroscope Co., Inc.—Electrical amplifiers. 16th April, 1945. (620042.)

12425. Marconi's Wireless Telegraph Co., Ltd.—Electrical contactors for rotatable shafts. 24th April, 1945. (620046.)

13802. Soc. de Condensation et d'Applications Mécaniques, Florisson, C. L. and Dubrulle, L.—Supersonic apparatus utilizing piezo-electric vibrators. 10th November, 1942. (Cognate application 13803/46.) (619872.)

14754. Philips Lamps, Ltd.—Electric resistors. 2nd May, 1945. (620049.)

14916. English Electric Co., Ltd., and Barlow, K. F.—Apparatus for electric arc welding. 17th May, 1946. (619962.)

14949. Quasi-Arc Co., Ltd., and Oliver, J. R.—Means for integrating the periods during which the arc voltage of an electric arc welding circuit is maintained between predetermined minimum and maximum values. 17th May, 1946. (619963.)

17260. Standard Telephones & Cables, Ltd.—System for communication of electrical signals. 19th June, 1945. (620053.)

17338. Ferranti, Ltd., and Wood, H.—Tuned oscillatory systems. 11th June, 1946. (620156.)

18001. Standard Telephones & Cables, Ltd.—Electrical control systems. 7th July, 1945. (Cognate applications 18002/46 and 18004/46.) (620157.)

18484. British Thomson-Houston Co., Ltd.—High-frequency transmitting apparatus. 19th June, 1945. (619968.)

18550. Batt, W. A. T.—Electrical signalling systems. 20th June, 1946. (620158.)

18576. Flowers, T. H.—Communication systems and signal receivers therefor. 20th June, 1946. (619878.)

18985. Reslosound, Ltd., and Murkham, L. W.—Loudspeakers, microphones and the like. 25th June, 1946. (620159.)

19216. Rutherford, J. N.—Combined steam de-superheater and feed water heater and distributor unit for steam generators. 27th June, 1946. (619970.)

21832. Standard Telephones & Cables, Ltd., Cleaver, R. F., and Sothcott, P.—Optical display arrangements for cathode-ray oscillographs. 22nd July, 1946. (619974.)

21945. Farnsworth Television & Radio Corporation.—Push-pull amplifier tube. 17th October, 1945. (619880.)

22089. Gavallet, A.—Electric lampholders and similar couplings. 1st August, 1945. (620164.)

23535. British Thomson-Houston Co., Ltd., Simpson, H., and Bocock, W. A.—Loud-speaker units. 8th August, 1946. (619882.)

24657. Metropolitan-Vickers Electrical Co., Ltd., and Smith, R. B.—Electrical vibrometers. 19th August, 1946. (620166.)

25079. Philips Lamps, Ltd.—Band-spread wireless receivers. 12th November, 1942. (619885.)

25631. British Thomson-Houston Co., Ltd., and Sinclair, W. D.—Electric lighting fittings. 27th August, 1946. (620167.)

25847. Rebut, P. C. M.—High-power, high-frequency vibrators. 8th January 1942. (619775.)

26213. Standard Telephones & Cables, Ltd.—Signalling systems. 15th November, 1945. (Cognate application 26214/46.) (619979.)

26241. Ferranti, Ltd., and Spencer, L. J.—Optical sighting devices. 31st August, 1946. (619891.)

26452. Nichols, W. T.—Variable resistance devices and electrical control systems incorporating such devices. 3rd September, 1946. (619777.)

27320. British Insulated Callender's Cables, Ltd., Hollingsworth, D. T., and Morrison, S. R.—Arrangement for detecting flow of fluid in electric cables and pipe lines. 11th September, 1946. (620170.)

29884. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Blocking-layer cells. 19th January, 1943. (619902.)

31369. English Electric Co., Ltd., Abbink-Spaink, J. H., and Mardis, L.—Engine-driven electric generating plant. 22nd October, 1946. (619904.)

32985. Metropolitan-Vickers Electrical Co., Ltd., Benson, L. E., and Turnbull, J. S.—Casting of metals. 6th November, 1946. (619991.)

33848. Metropolitan-Vickers Electrical Co., Ltd., Fowler, J., and Diggle, H.—Devices for drying air or other gases. 14th November, 1946. (619993.)

37153. Philips Lamps, Ltd.—Circuit arrangements for the amplification of high-frequency electrical oscillations. 4th August, 1943. (619784.)

37190. Griffiths, H. A. H.—Electrical condensers. 17th December, 1946. (620184.)

37501. General Electric Co., Ltd., and Levy, M. M.—Multichannel signalling systems. 20th December, 1946. (619785.)

37576. Philips Lamps, Ltd.—Coils for electric circuits. 25th August, 1943. (619996.)

37689. R.M. Electric, Ltd., and Parsons, D. R.—High-frequency inductances and transformers. 23rd December, 1946. (619930.)

37857. Pye, Ltd., and Lawson, D. I.—Generators of and amplifiers for sawtooth current wave-forms. 24th December, 1946. (619795.)

37891. Telefonaktiebolalet L. M. Ericsson.—Slow-releasing electro-magnetic relay. 29th January, 1946. (619799.)

37898. Hazeltine Corporation. — Pulse-modulated oscillation generator. 4th January, 1946. (619802.)

37904. Wilcolator Co.—Thermal electric switches. 20th August, 1943. (619803.)

37927. Scholes & Co., Ltd., G. H., and Pearce, F. J.—Electric plug-and-socket couplings. 24th December, 1946. (619804.)

38049. British Thomson-Houston Co., Ltd.—Waste disposal apparatus for attachment to a sink. 29th December, 1945. (619820.)

38055. Marconi's Wireless Telegraph Co., Ltd., and Pearce, R.—Indicating-scale arrangements. 30th December, 1946. (619823.)

38068. Smith & Sons (England), Ltd., S., and Tieche, E. E.—Electric make-and-break devices operated by oscillatory systems. 30th December, 1946. (619825.)

38140. Metropolitan-Vickers Electrical Co., Ltd., and Mandl, A.—Dynamo-electric machines. 31st December, 1946. (619837.)

38166. Etablissements E. Dervaux. — Clamping gripper, particularly adapted for use in connection with the suspension of electric overhead electric cables. 6th December, 1946. (619839.)

38167. G.M. Engineering (Acton), Ltd. and Newell, J.—Electrical fuse units. 31st December, 1946. (619840.)

1947

1. Traynor, B.—Illuminated display devices. 1st January, 1947. (619997.)

18. General Electric Co., Ltd., and Warhurst, F.—Automatic switching devices for controlling the illumination of advertising or instructional display panels. 1st January, 1947. (620002.)

25. General Electric Co., Ltd., Cropper, W. C., and Wells, G. M.—Vibratory tools. 1st January, 1947. (620004.)

50. Lucas, Ltd., J., and Laird, J. A.—Means for operating gas-discharge lamps. 1st January, 1947. (620006.)

63. British Thomson-Houston Co., Ltd. (General Electric Co.).—Laminated core constructions. 1st January, 1947. (620008.)

66. Philips Lamps, Ltd.—Magnetic cores. 7th May, 1943. (620009.)

67. Philips Lamps, Ltd.—Transceivers. 10th September, 1943. (620010.)

88. D.P. Battery Co., Ltd., and Brown, H. G.—End cell regulator switches for battery circuits. 1st January, 1947. (620013.)

124. Lucas, Ltd., J., Swift, W., and Mason, E.—Machines for winding coils for dynamo-electric machines. 2nd January, 1947. (620019.)

164. Sullivan, Ltd., H. W., and Griffiths, W. H. F.—Electrical condensers. 2nd January, 1947. (620024.)

203. Anderson, Boyes & Co., Ltd., and Anderson, A.—Adaptors for use in conjunction with the plug-and-socket cable connectors of electric machines. 3rd January, 1947. (620074.)

223. Smart & Brown (Engineers), Ltd., and Wyborn, E. J.—Electric plug-and-socket connections. 3rd January, 1947. (620080.)

233. General Electric Co., Ltd., Veevers, J. F., and Turner, H. C.—Indicating instruments. 3rd January, 1947. (620082.)

251. Soc. des Moteurs Thermiques.—Starting and driving mechanism for electric generators and other machines. 31st August, 1944. (620085.)

268. Metropolitan-Vickers Electrical Co., Ltd., Dodds, J. M., and Miller, C. W.—Control apparatus for cathode-ray tubes 3rd January, 1947. (620087.)

272. Metropolitan-Vickers Electrical Co., Ltd., Crowley-Milling, M. C., and Scoles, G. J.—Control apparatus for cathode-ray tubes. 3rd January, 1947. (620088.)

296. Ipscal, Ltd., and Webb, E. F. D.—Mercury switches. 3rd January, 1947. (620091.)

298. Soc. Française Radio-Electrique. — Glasses having a low coefficient of expansion. 3rd January, 1947. (620092.)

327. Tucker & Co., Ltd., J. H., and Avison, R. G.—Plug-and-socket electrical connections. 4th January, 1947. (620094.)

342. Automatic Telephone & Electric Co., Ltd., and Robinson, N. H.—Telephone systems. 4th January, 1947. (620098.)

363. Westinghouse Brake & Signal Co., Ltd., Sell, R. G., and Cubitt, R. H.—Alternating-current rectifiers. 6th January, 1947. (620102.)

479. Metropolitan-Vickers Electrical Co., Ltd., Jackson, L., and Walsh, N. A.—Horizontal pull-out drawers, trays and the like. 6th January, 1947. (620113.)

489. Tucker & Co., Ltd., J. H., and Avison, R. G.—Plug-and-socket electrical connectors. 7th January, 1947. (620186.)

550. Versnel, F. H.—Means for electrically operating a member to be moved in two directions, particularly for actuating doors, windows and the like. 7th January, 1946. (620193.)

583. Applied High Frequency, Ltd., Autie, E. G., and Johnes, F. W.—Welding of dielectric plastics. 7th January, 1947. (620196.)

588. Linde Air Products Co.—Automatic electric welding system. 5th February, 1946. (620198.)

592. G.M. Engineering (Acton), Ltd., and Newell, J.—Electric fuse switches. 7th January, 1947. (620200.)

14801. Mallory & Co., Inc., P. R.—Combined sparking plugs and electrical ignition transformers. 12th August, 1944. (Divided out of 619947.) (620025.)

21565. Westinghouse Electric International Co.—Engine control systems. 17th July, 1941. (619754.)

23436. General Electric Co., Ltd., and Espley, D. C.—Signal transmission systems employing radio links. 15th April, 1946. (Divided out of 619772.) (619846.)

1948

13397. Avimo, Ltd., and Stevens, G. G. M. (Legal representative of Stevens, H. C. M., deceased).—Electric switches for kinematograph cameras. 23rd March, 1945. (Divided out of 619851.) (619936.)

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Argentina. — BUENOS AIRES. — 20th April. National Waterworks Department. Transformers. (C.R.E. (I.B.) 8532/49. Ten/322.)*

Ecuador. — 26th April (extended date). Machinery and other material for Salcedo hydro-electric plant. (C.R.E. (I.B.) 7850/49. Ten/301A/I.B.1.)*

Edinburgh.—North of Scotland Hydro-Electric Board. Electric lighting and heating services for switching station and plant house at Errochty. (See this issue.)

Hull.—13th April. Town Council. Electric lighting and power installations at new junior and infants' departments at Francis Askew School. Town clerk, Guildhall.

India.—13th June (extended date). Madras Electricity Department. Substation equipment and transformers. (C.R.E. (I.B.) 363/49. Ten/147B/I.B.1.)*

London.—6th June. British Electricity Authority. Experimental 100 kW wind-driven generator. (See this issue.)

New Zealand.—WELLINGTON.—27th April. Post and Telegraph Department. Telephone cable. (C.R.E. (I.B.) 8623/49. Ten/319.)*

Saffron Walden.—25th April. R.D.C. Installation of an electric borehole pump at Wendens Ambo pumping station. A. W. Overall, Council Offices, Debden Road.

South Africa.—JOHANNESBURG.—21st April. South African Railways Stores Department. Switchgear, transformers, etc. (C.R.E. (I.B.) 8713/49. Ten/335/I.B.1.)*

5th May. South African Railways Stores Department. Transformers, switchgear, batteries, battery and trickle chargers, cables, etc. (C.R.E. (I.B.) 8873/49. Ten/331.)*

Weymouth.—19th April. Corporation. Electrical installations for housing schemes. (See this issue.) 25th April. Electrical installations in 32 flats. (See this issue.)

*** Specifications may be inspected at the Commercial Relations and Exports Department, Thames House North, Millbank, S.W.1.**

Orders Placed

London.—L.C.C. Electrical installation at Lauriston Road School, Hackney.—W. H. Gaze & Sons.

Newcastle-on-Tyne.—Education Committee. Installation of electric lighting at "Elms West" (£324) (in place of the previous contractor who withdrew his tender).—Falconar Cross & Co., Electric lighting installation at the West Jesmond Emergency Training College (£235).—Wilson & Ridley.

Portsmouth.—Corporation. Electrical equipment in connection with extension of the trolley-bus routes.—English Electric Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Amble.—Observation ward, Coquetdale Cottage Hospital; R. Carse & Son, builders, Amble.

Birmingham.—School and canteen, Sheldon (£69,000); J. & F. Wootton, Ltd., builders, Pinfold, Bloxwich, Walsall.

Blyth (Northumberland).—Houses (62) for T.C. Builders (all local firms): J. E. Dover, G. Towers & Son, R. Hush, Blyth Co-op. Society, J. Goulding & Son, J. W. Simpson & Son, and T. H. Nicholson.

Bolton.—Factory, Manchester Road, for Disabled Persons' Employment Association; Wm. Townson & Sons, Ltd., builders, Park Hill Street.

Brandon.—Factory extensions, Langley Moor, for I. & R. Morley; F. Hedley, architect, Farnley Mount, Neville's Cross, Durham.

Castleford.—Additions and alterations to Maternity Home, Barnes Road, for Hospitals Management Committee; R. A. Easdale & Son, architects, Bradley Street.

Darlington.—Girls' school, Hummersknott estate; borough architect, Central Buildings.

Additions to factory, West Auckland Road, for the Chemical & Insulating Co., Ltd.

Darwen.—Houses (100), St. James' estate, for T.C. (£127,437); Wm. Thornton & Sons, Ltd., builders, 38, Wellington Street, Liverpool, 8.

Denbighshire.—Primary school, Towyn; Gilbert D. Wiles, county architect, Grove Park, Wrexham.

Derbyshire.—Secondary school, Chapel-en-le-Frith; F. H. Crossley, county architect. St. Mary's Gate, Derby.

Easingwold.—Factory, Stillington Road, for Mallinson & Sons, worsted and woollen manufacturers, Linthwaite; J. Rangeley, architect, 2, Minster Gates, York.

Eccles.—Houses (50), Ellesmere Park; G. O. Jones, town clerk, Town Hall.

Fife.—Municipal centre, Cupar (£232,000); county architect.

Gateshead.—Houses (54) for Town Council; J. Clark & Son, builders, New Seaham, Co. Durham.

Great Yarmouth.—School of art, Trafalgar Road; borough engineer, 15, Regent Street.

Guernsey.—States dairy, Bailiff's Cross; G. Heggs, engineer, States Office.

Hebburn-on-Tyne.—Houses (128) for U.D.C. Builders: G. Bailey, Ltd., King Street, South Shields (56); J. M. Black, Ltd., Glen Street, Hebburn (30); and D. Glen, Albert Road, Jarrow (42).

Lancashire.—Extensions to Grosvenor Road County School, Swinton (£105,000); G. Noel Hill, county architect, Fishergate Hill, Preston.

Lindsey.—Infants' school, Ashby (£49,639); R. C. Clark, county architect, Lincoln.

Llanelly.—Infants' school, Felinfoel; W. T. Lloyd, county architect, Carmarthen.

London.—HACKNEY.—Block of dwellings, including a nursery school, at Gascoyne estate extension; Stewart & Partners, Ltd., W.1.

CAMBERWELL.—Block of dwellings, East Surrey Grove site; Tersons, Ltd., E.C.1.

Manchester.—Printing works, Cheetham, for "News of the World"; Ellis, Clark & Gallanaugh, architects, 58, Grosvenor Street, S.W.1.

Rebuilding furniture showrooms, 131/137, Stretford Road, for John Rhind & Sons, Ltd.; W. Thorpe & Son, Ltd., builders, Chester Road, Cornbrook.

Middlesbrough.—Additional houses for the T.C. on Thorntree estate; builders: P. Shannon (12), J. Oakley (12), W. Taylor & Son (12), H. Halliman (6), W. H. Causier (10). All local builders.

Alterations to municipal buildings (£8,000); borough engineer.

Proposed new Stainsby Nos. 1 and 2 schools; S. W. Milburn & Partners, architects, The Esplanade, Sunderland.

Motherwell.—Works additions (£69,380); Motherwell Bridge & Engineering Co., Ltd., Bellshill Road.

North Riding.—Experimental health centres, Eston and Pickering; J. Catchpole, county architect, Northallerton.

Northampton.—New Gladstone School (320 places), with kitchen, dining room and boiler house; H. C. Perrin, chief education officer, Springfield, Cliftonville, Northampton.

Northenden.—Houses (12), Netherwood Road and Beechpark Avenue; Fieldhouse & Ross (Builders), Ltd., 80, Coupland Street, Manchester, 15.

Pontefract.—Pithead baths, Upton Collieries, for Miners' National Welfare Council (£121,000); W. G. Birch (Harrogate), Ltd., builders, 33, Springfield Terrace, Harrogate.

Roggiett (Mon).—Junior and infants' school, site near Severn Tunnel; C. L. Jones, county architect, Queen's Hill, Newport, Mon.

Rotherham.—New works and garage, Sheffield Road; Steel, Peech & Tozer.

Scunthorpe.—Houses (150), Lincoln Gardens; W. P. Errington, town clerk, 34, High Street.

Stafford.—Houses (66), Rising Brook estate (£86,053); Wm. Whittingham, Ltd., builders, Powlett Street, Wolverhampton.

Civic restaurant; T. H. Higson, borough surveyor, Borough Hall.

Stockton-on-Tees. — Offices for Stockton Spinners, Ltd.; R. S. Edmundson, architect, Holmegarth, Layton Road, Rawdon, Leeds.

Shops and flats, Albany Road estate; borough architect, 28, The Square, Thistle Green.

Stretford.—Houses (34), Moss Park estate; Hampson & Kemp, Ltd., builders, Crescent Road, Chorlton-cum-Hardy, Manchester, 21.

Extensions to Motor Works, Chester Road, for Graham Bros (Motors), Ltd.; L. Brown & Son, Ltd., builders, Wilmslow.

Extensions to works, Talbot Road, for Parkinson & Cowans (Gas Meters), Ltd.; E. A. Gascoigne & Son, builders, 417, Stockport Road, Manchester, 12.

Sunderland.—Primary school, Hill View (£97,000); H. E. Pitt, Ltd., builders, Millfield, Sunderland.

Swanage.—Houses (46), Greyseed estate; T. Arnold, clerk to U.D.C., Town Hall.

Trafford Park.—Warehouse, Westinghouse Road, for Port of Manchester Warehouses, Ltd.; E. Wood & Co., Ltd., Ocean Works, Trafford Park, Manchester, 17.

Turton.—Houses (26), Toppings estate, Eagley, for U.D.C.; Drapers, Ltd., builders, Bury Road, Bolton.

Wallasey.—Houses (20); R. J. Barton & Sons, Ltd., builders, 866a, Liverpool Road, Ainsdale.

Wallsend.—Houses (78); G. Teasdale, borough surveyor, Town Hall.

Walsall.—County school, Alum Well Road (£300,000); M. E. Habershon, borough engineer, Council House. (First instalment £47,925.)

West Riding.—County primary school, Woodlands, Doncaster; county architect, Wakefield.

Weymouth.—Holy Trinity school (infants' and junior schools); Crickmay & Sons, architects, 23, St. Thomas Street.

Whitley Bay.—Houses (32), Seatonville estate; surveyor, U.D.C. Offices.

Wigan.—Church hall, Greenough Street (£8,000); Clough & Gaskell, Ltd., builders, Billinge Road Saw Mills.

Catholic secondary schools, Newtown, Springfield and Whelley (£360,000); Rev. Fr. H. Shee, P.P., St. Joseph's.

Worcestershire.—Primary school, Causeway Green, Oldbury; L. C. Lomas, county architect, 60, The Tything, Worcester.

Yarmouth (I.o.W.).—Fire station, Nestesbury Road; county architect, County Hall, Newport.

Export Inquiries

WE have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territories. We shall be glad to pass on to them replies received from readers, which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require the usual references:—

Southern Rhodesia.—Agents for electrical and mechanical goods wish to hear from electrical manufacturers who could offer agencies for additional lines. (X.206.)

Netherlands.—A manufacturers' agent in The Hague requires particulars and prices of time switches, clocks, cable and wire, electric washing machines, etc. (X.207.)

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 30th March:—

EMIDICTA.—No. 668,723. Class 9. Apparatus and instruments for use in the recording and reproduction of sound.—E.M.I. Factories, Ltd., Gramophone Buildings, Blyth Road, Hayes, Middlesex.

INVICTA (design).—No. 669,297. Class 9. Scientific, nautical, telegraphic, telephonic, television, radio and acoustic instruments and apparatus, and parts thereof included in Class 9; and gramophone pick-ups, wireless aerials, electric batteries and electric accumulators.—Invicta Radio, Ltd., St. Andrew's Road, Cambridge.